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FOURTH ANNUAL REPORT
OF THE
WATER COMMISSIONER



FOR THE YEAR ENDING
JANUARY 31, 1899

No 6355.52

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FOURTH ANNUAL REPORT

OF THE

WATER COMMISSIONER

FOR THE

YEAR ENDING JANUARY 31, 1899

Printed for the Department



BOSTON

MUNICIPAL PRINTING OFFICE

1899

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1898-9.

Rector, Water Commissioners,
Nov. 8, 1899-



OFFICE OF THE WATER COMMISSIONER,
CITY HALL, BOSTON, February 1, 1899.

HON. JOSIAH QUINCY, *Mayor* :

SIR, — I submit a report of the doings of the Water Department for the year ending January 31, 1899.

The net income of the department shows a decrease as compared with last year. This is due to the taking of a portion of our system by the State.

The work of the department has been of a more varied nature than in previous years. In addition to the usual detail work thirty-three and six-tenths (33.6) miles of main pipe were laid, eight (8) miles of which were relaid.

The extension of our distribution service has so improved the supply in the Dorchester district that the Wayne-street pumping station at Elm Hill has been abandoned.

The laying of pipes in Columbia road has progressed favorably, and the new line of pipe for supplying the islands in the harbor has been almost laid to the sea-wall on Moon Island opposite Long Island.

The water service in West Roxbury and other portions of the city has been materially improved by the extension of mains in those localities. The system of salt-water mains (as an auxiliary fire service) has been extended so as to enable the fire-boats to make connections with the system, and its success thoroughly demonstrated by tests.

The relaying work costs higher year by year, owing to the more crowded condition of the streets.

The apparatus for taking frost out of the ground that was used in the department last winter has been much improved. We are now able to lay main pipe in the winter as well as in the summer.

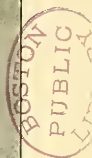
We have changed our method of excavating main pipe trenches. It was the practice to dig the whole length of the main pipe trench as wide as it must necessarily be at the bell-holes. Under the new system the portions of the trench between the holes are made just wide enough to enable the pipes to be laid. The trench also narrows as it tends toward the bottom. A saving is expected from this change, not only in the first cost of the work, but in the maintenance of streets after the pipe is laid.

A system of numbering hydrants throughout the city has been adopted, so that hereafter they will be known by their numbers, and the record of each is kept, showing the cost of maintenance, when and by whom inspected, etc. In addition, in order to show what gates are division gates, and what gates control main, service, fire, motor and elevator pipes, all gates are to be marked and numbered. It will be possible by this plan of numbering to keep a proper supervision of the hydrants and gates, and to locate them quickly.

There were established during last summer ten cold water fountains, so that water could be furnished to the public in summer weather at a temperature pleasant for drinking purposes. This was accomplished by chilling the water by running it through small reservoirs and pipes surrounded with chopped ice, the ice and the pipes being enclosed in a box insulated on the outside by a patent material. The cost of supplying these fountains with ice was nominal, as they consumed less than 500 lbs. each per day. On warm days the average number of people supplied per hour was over 600 for each fountain in the congested parts of the city. These fountains were found to be very acceptable to the public, and their patronage was so great as to create a demand for the extension of the system. It is the intention of the department to increase the number of cold-water fountains in the coming summer. In order that this may be done at a minimum of cost, we have cut more than sufficient ice from our reservoirs in Brookline and East Boston to supply our fountains for the coming season. The ice is stored in houses constructed on the grounds. We estimate that it will be possible to supply at least forty cold-water fountains. Through the courtesy of the Eastern



CUTTING ICE ON EAST BOSTON RESERVOIR.





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Cold Storage Company, Walter L. Hill, president, plans for a cold water fountain connected with their pipe line have been prepared, and the fountain will be located in Faneuil Hall square, and in use during the coming summer. If it works successfully — and I have no doubt it will — it is proposed to still further utilize the cold-storage system in connection with our cold-water fountains. The drinking fountain which has been adopted and will be in use hereafter is artistic in its construction, and has received the approval of the Art Commission.

Owing to the establishment of the Metropolitan Water System the department will not hereafter maintain the pumping stations at West Roxbury and East Boston.

The Deacon service has been transferred from the Distribution to the Income Division. The methods in practice in the Meter Division, to which allusion was made in last years' report, have been changed, and the accounts there, as well as in the rest of the department, are now being kept correctly. The improvement in keeping records and accounts can be best realized from the fact that previous to February 1, 1896, the reports which formed the basis of the records and the accounts of the department were mostly unsigned, and were not made upon the ground where the work was done, but were transmitted by word of mouth to a foreman stationed in the yard at Albany street. Their accuracy depended wholly upon the memory of those who made them, and their knowledge of what was required for the basis of a proper record.

We now have a system of individual and original reports. These reports are signed by some employee of the department who has personal supervision of the work. Since the inauguration of this system the utter inadequacy of the old system has been forcibly demonstrated, and it is easy to understand why, previous to February 1, 1896, the records were not correctly kept. I submit the reports of Andrew Stewart, Examiner of Accounts, showing the changes and improvements that have been made in the records and accounts of the department, and the present condition of the same. (*See Appendix A.*)

The department has paid constant attention to electrolysis, and in the Engineer's report will be found the facts in detail.

Under the head of the pressing needs of the department, I would again respectfully call your attention to the crowded condition of the yard of the Distribution Division at 710

Albany street, where there is a lack of sufficient area to perform the work in an economical manner. All castings, pipe, lumber, etc., used by the department are received in this yard and thence distributed wherever the work may require. A year ago a part of this yard was transferred to the City Hospital. This transfer has increased the expense of handling our pipe and stock of all kinds. I am of the opinion that our present wharf facilities should be increased at least one-half.

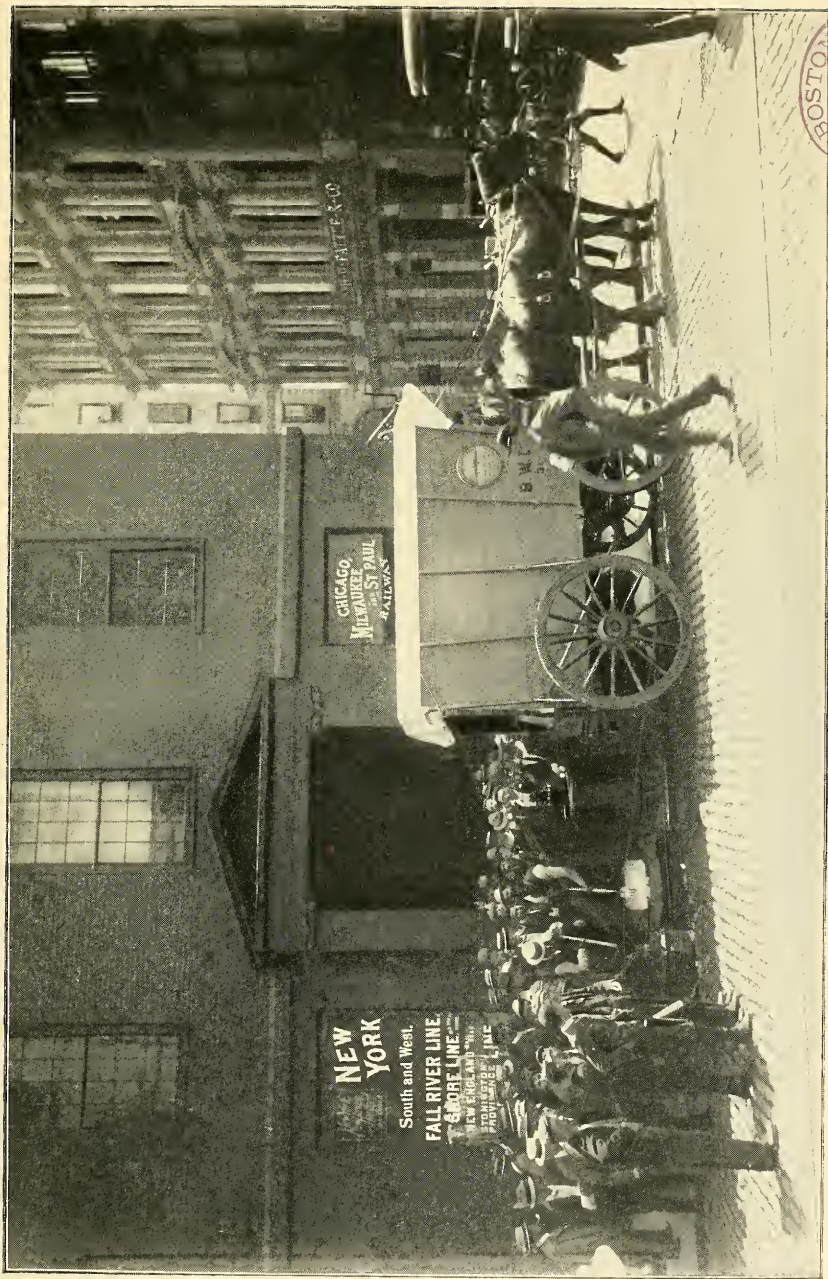
It is essential to completely modernize the machinery of our present machine shop. By the adoption of new and improved machinery the work can be done at a great deal less cost than at the present time.

The style of post hydrants in use in the department should be replaced by more modern hydrants. Now when an engine attaches to a post hydrant it is necessary to shut down the hydrant, in order that another engine can attach to the same hydrant. A few of our hydrants, however, are arranged with independent shut-offs to each outlet, which does away with the necessity of shutting down the hydrant as each engine attaches to it. The general adoption of this latter system of hydrants is the one which I recommend. This can be done gradually at a cost of about \$8,000 to \$10,000 a year.

To meet the needs enumerated above, I would recommend the making of a special appropriation.

On February 1, 1896, I qualified as Water Commissioner. On the department roll dated January 30, 1896, there were 868 men eligible for employment, and of these about 600 were at work. Commencing with the latter part of December, 1895, the balance had been suspended from time to time, in accordance with the yearly practice of the department. These suspensions did not reach all grades of labor; they affected only those who were least able to bear it and whose services the department is least able to dispense with, viz.: the laborers on trench work and main pipe laying.

For the last three years all the men of the department have been employed in winter as well as in summer, and not laid off on two-thirds, one-half or one-quarter time, as was the practice previous to your administration. On January 26, 1899, the last pay-day of the fiscal year 1898-99, there were on the pay roll 885 men, or every man who was able to work. In order that the full force might be employed continuously, more day work has been done by our own employees in each of the three years of your administration than in 1895. It would be natural to expect that under these



SUPPLYING COLD WATER FOUNTAIN WITH ICE.

conditions the yearly expenses of the department would be increased, but such is not the fact. The amount of money expended during each of the fiscal years 1896, 1897 and 1898 is less than that expended in 1895, and the character and the amount of work done during any one of the years 1896, 1897 and 1898 will compare more than favorably with that done during 1895. The appended statements of money expended and work done during the years in question will substantiate this statement.

EXPENDITURES OF THE BOSTON WATER DEPARTMENT.

1895-96 to 1898-99, inclusive.

1895-96.

Current expenses (Auditor's Report, pp. 137, 138) . .	\$610,101 70
Extension of Mains, etc. (Auditor's Report, p. 141) . .	251,984 94
Additional Supply (Auditor's Report, p. 140) . . .	382,819 01
	<hr/>
Paid on account of work done for corporations, etc. .	\$1,244,905 65
	18,648 71
Total	<hr/> <u>\$1,226,256 94</u>

1896-97.

Current expenses (Auditor's Report, p. 151) . . .	\$591,550 42
Extension of Mains, etc. (Auditor's Report, p. 153) . .	232,142 98
Additional Supply, (Auditor's Report, p. 153) . . .	217,070 45
	<hr/>
Paid on account of work done for corporations, etc. (Second Annual Report Water Commissioner, pp. 11-13)	\$1,040,763 85
	17,366 14
Total	<hr/> <u>\$1,023,397 71</u>

1897-98.

Current expenses (Auditor's Report, p. 164) . . .	\$623,476 51
Extension of Mains, etc. (Auditor's Report, p. 165) . .	281,782 32
Additional Supply, (Auditor's Report, p. 165) . . .	179,879 01
	<hr/>
Paid on account of work done for corporations, etc. (Third Annual Report Water Commissioner, pp. 13, 14),	\$1,085,137 84
	13,300 73
Total	<hr/> <u>\$1,071,837 11</u>

1898-99.

Current expenses and Extension of Mains— one appropriation—(Auditor's Exhibit, January 31, 1899, p. 19) . .	\$808,582 59
From loan of \$200,000, issued November, 1898, for extension of mains (Auditor's Exhibit, January 31, 1899, p. 17)	152,601 63
	<hr/>
Paid on account of work done for corporations, etc. .	\$961,184 22
	47,798 94
Total	<hr/> <u>\$913,385 28</u>

The amounts expended during the above years upon portions of the Water Department system now held by the State, estimated as closely as possible, are as follows :

1895-96	.	.	.	.	.	.	\$233,482 98
1896-97	.	.	.	.	.	.	200,608 84
1897-98	.	.	.	.	.	.	168,862 83
1898-99	.	.	.	.	.	.	14,557 91

The amount for the year 1898-99 (\$14,557.91) subtracted from the total amount as stated (\$913,385.28) would leave \$898,827.37 as the net expenditure for that year.

The total amount for the year 1897-98, that is, including the amounts paid on account of portions taken by the State, was \$1,071,837.11, showing a difference of expenditure between the two years of \$173,009.74, caused by the loss to the city of those portions of the department taken by the State.

MILES OF PIPE LAID BY DAY LABOR.

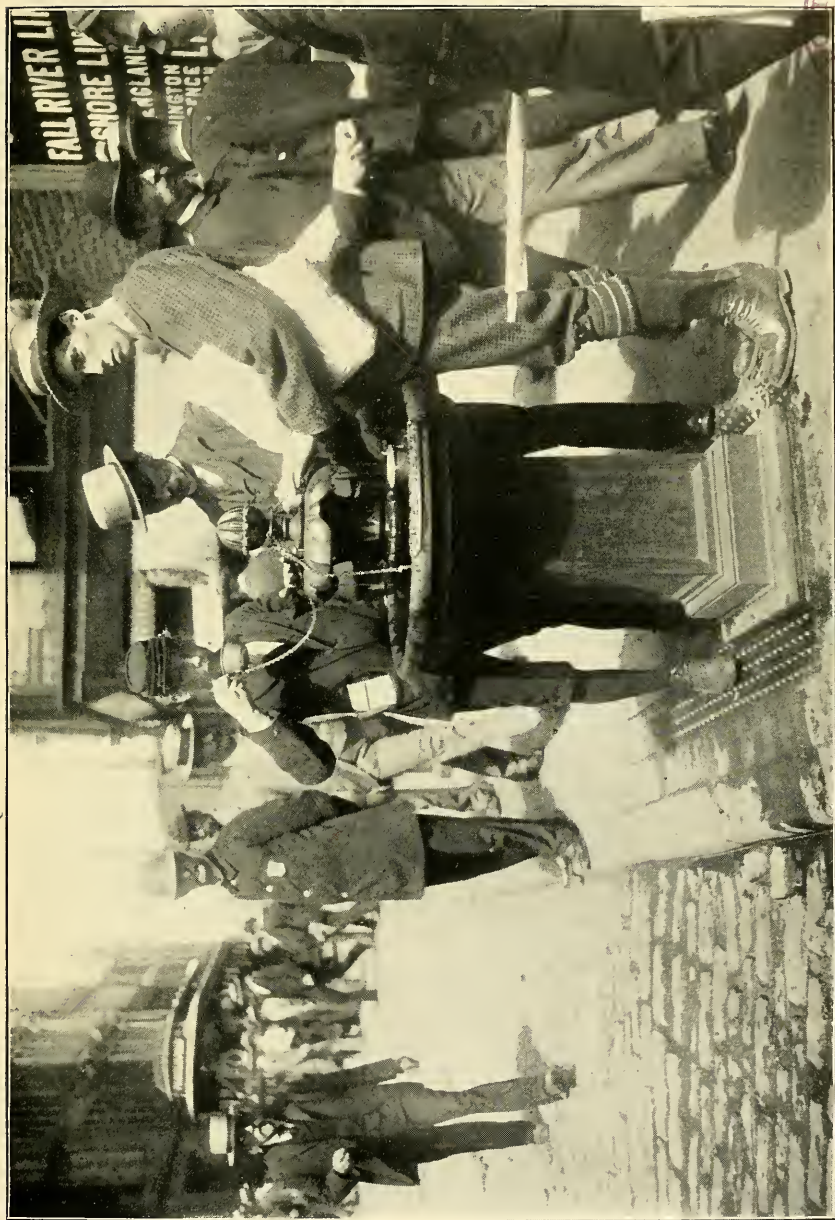
1895-96 to 1898-99, inclusive.

	1895-96.	1896-97.	1897-98.	1898-99.
By employees.....	23.1	33.4	28.04	32.0
By other than employees...	4.9	3.0	0.16	1.6
Total	28.0	36.4	28.2	33.6

The work of pipe laying in the heart of the city is difficult and very costly. Of the total mileage of pipe laid during each of the last four years the amount of main pipe laid in the downtown streets was far less in the year 1895-6 than in either of the three subsequent years, as the following comparative statement shows :

1895-96.	1896-97.	1897-98.	1898-99.
5,722 feet.	19,197 feet.	20,763 feet.	14,721 feet.

Relaying pipe, no matter in what part of the city, is always difficult work, and expensive compared with ordinary pipe laying, as the house connections, hydrants, etc., have to be transferred from the old to the new mains. When the relaying is in the City Proper, added to the usual cost is the expense of night and Sunday work. This means extra cost in the way of compensation to the men and other incidental expenses. Very little relaying was done previous to 1896, and, as a consequence, work which should have been done



COLD WATER FOUNTAIN ON A COOL DAY

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then was begun and completed during the years 1896, 1897 and 1898. This work should never have been delayed as long as it was, as the pipes were found in a poor condition and a source of danger to the community.

The following is the amount of pipe relaid for the last four years:

1895-96.	1896-97.	1897-98.	1898-99.
15,840 feet.	45,408 feet.	36,960 feet.	42,240 feet.

The amount of this relaying that was done in the downtown streets is as follows:

1895-96.	1896-97.	1897-98.	1898-99.
4,000 feet.	15,840 feet.	13,200 feet.	7,920 feet.

The work in the machine, carpenter and blacksmith shops in each of the past three years was very much more than it was in 1895, and the same is true of the general work of the department, such as establishing and abandoning gates, hydrants, air-cocks, water posts, etc., the increase in some instances being from 100 to 200 per cent. over the year 1895. Again, the work has been more varied during the last three years, especially during 1898. In this latter year we built two ice-houses, one at East Boston and the other at Brookline, and cut and stored the ice needed to supply the fountains next summer, built and macadamized roads, established nineteen fountains and abandoned eight. Of the nineteen fountains, eight were cold-water fountains, and two were old fountains to which cold-water attachments were made. In addition to maintaining these cold-water fountains, we have performed a variety of work which the department has not done heretofore.

I am of the opinion that the doing of so much day work has been beneficial to the city, as the work done was of the best quality. This is illustrated by the laying of the salt-water mains for the extra fire service. The department laid about one mile, which, at completion, was tested under a pressure of 180 to 220 pounds to the square inch, and no leak was shown.

The receipts and disbursements of the department for the year were as follows:

Total receipts of the Water Works, from all sources, for the year ending January 31, 1899:

Sales of water	\$2,124,514 30
Shutting off and letting on water and fees	6,776 75
<i>Carried forward</i>	<u>\$2,131,291 05</u>

<i>Brought forward</i>	\$2,131,291 05
Elevator, fire and service pipes, sale of old materials, etc.	67,819 53
Boston and Albany R. R. Co., on account of change of road-bed at Lake Cochituate	32,998 00
¹ Interest on water works fund	72,962 16
Total receipts	\$2,305,070 74
Less refunded water rates	4,209 93
Net receipts	<u>\$2,300,860 81</u>

Total expenditures of the Water Works, from revenue, for the year ending January 31, 1899:

² Current expenses	\$554,959 72
³ Extension of mains, etc.	253,622 87
	<u>\$808,582 59</u>
Interest on funded debt	841,792 52
Sinking-fund requirement, 1897-98	193,395 00
Metropolitan water assessment	285,600 54
Amount paid Chelsea, Somerville and Everett, under contracts	9,088 07
Balance to general revenue account of city	162,402 09
	<u>\$2,300,860 81</u>

COST OF CONSTRUCTION AND CONDITION OF THE WATER DEBT.

Cost of construction of Water Works to February 1, 1898	\$26,831,753 14
Cost of construction of Water Works to February 1, 1899	22,243,663 40
⁴ Decrease during the year	<u>\$4,588,089 74</u>
Stock on hand February 1, 1898	\$152,665 07
Stock on hand February 1, 1899	137,755 55
Decrease during the year	<u>\$14,909 52</u>
The outstanding Water Loans February 1, 1898, were	\$17,911,273 98
The outstanding Water Loans February 1, 1899, were	17,121,273 98
Decrease during the year	<u>\$790,000 00</u>
The Water Sinking-Fund February 1, 1898, was	\$9,852,760 01
The Water Sinking-Fund February 1, 1899, was	9,487,119 88
Decrease during the year	<u>\$365,640 13</u>

¹ Under order of City Council, approved September 16, 1898.

² One appropriation was made, covering current expenses and extension for the year 1898-99 from revenue. From the amount of \$808,582.59, should be deducted the sums of \$47,798.94, expended for work done for corporations, etc., and \$14,557.91 expended upon portions of system now held by the State, leaving \$746,225.74 as the actual amount expended for current expenses and extension of mains, etc., from revenue. Details will be found on pages 16 and 17.

³ The total amount expended for extension of mains, etc., for the year was \$406,224.50, from which \$152,601.63 was transferred to a new loan of \$200,000 issued in November.

⁴ Decrease due to crediting amount paid by the State on account of taking by Metropolitan Water Board \$5,000,000, and amount received from sale of land on South Boston reservoir site to School Committee, \$23,893.86.



COLD WATER FOUNTAIN ON A HOT DAY.



WATER DEPARTMENT.

9

Net Water Debt February 1, 1898	\$8,058,513 97
Net Water Debt February 1, 1899	7,634,154 10
Decrease during the year	<u>\$424,359 87</u>

SUMMARY OF COST OF WORKS TO FEBRUARY 1, 1899.

Cochituate supply :

Lake Cochituate	\$291,838 35	
Compensating reservoirs	66,859 80	
Land and water damages	248,827 34	
Engineering expenses to Jan- uary 1, 1852	40,000 00	
Cochituate aqueduct	1,068,425 24	
	<hr/>	\$1,715,950 73

Sudbury supply :

Reservoir No. 1	\$257,143 81	
“ “ 2	465,954 11	
“ “ 3	419,402 72	
“ “ 4	813,846 38	
“ “ 5, to date	1,114,752 43	
“ “ 6	911,752 33	
Whitehall pond	333,967 57	
Cedar swamp	33,599 21	
Work about Farm pond	17,297 94	
Roadway in Framingham	23,947 32	
Land damages, not otherwise specified	348,346 38	
Water damages	559,190 64	
Temporary connection with Lake Cochituate	75,611 73	
Investigations of Shawshine and Charles rivers, etc.	27,646 59	
Protection of supplies	364,120 82	
Engineering and engineering expenses	300,371 22	
Office expenses, travelling, etc.	80,594 74	
Miscellaneous	40,388 76	
Conduit and connections at Chestnut-Hill Reservoir	3,082,661 95	
	<hr/>	9,270,596 65

Distributing reservoirs and dis- tribution :

Brookline Reservoir	\$200,077 21	
Beacon-Hill “ (net cost)	363,533 21	
Chestnut-Hill “	2,284,115 33	
South Boston “ (net cost)	67,014 24	
East “ “	66,103 09	
	<hr/>	

Carried forward . . . \$2,980,843 08 \$10,986,547 38

<i>Brought forward</i> . . .	\$2,980,843 08	\$10,986,547 38
Distributing reservoirs and distribution. — <i>Continued.</i>		
Parker-Hill Reservoir . . .	205,793 81	
Fisher-Hill “ . . .	191,135 35	
Roxbury high service . . .	103,829 53	
Brighton “ “ . . .	7,745 00	
East Boston high service . . .	30,208 12	
West Roxbury high service . . .	22,346 56	
Chestnut-Hill pumping-station . . .	525,195 46	
Jamaica-pond aqueduct . . .	88,417 20	
Pipe-yards and buildings . . .	94,832 16	
Engineering expenses . . .	57,873 58	
Distribution . . .	11,297,346 29	
		<u>15,605,566 14</u>

Total cost of Sudbury and Cochituate Works, \$26,592,113 52

Cost of Mystic Works to February 1, 1899 :		
Land damages	\$153,211 63	
Dam	\$17,167 26	
Grubbing at lake	9,393 26	
Lowering Mystic river	3,012 06	
		<u>29,572 58</u>
Conduit	129,714 30	
Engine-house	\$83,388 75	
Engines	213,834 72	
		<u>297,223 47</u>
Reservoir	141,856 26	
Distribution	874,863 58	
Buildings	18,603 05	
Engineering, inspection and salaries	53,216 27	
Mystic-valley sewer	83,608 70	
Miscellaneous	24,446 88	
		<u>6,154,766 84</u>
Total cost of Mystic Works		\$1,806,316 72
Total cost of combined supplies		<u>\$28,398,430 24</u>
Credit by amount received from the State on account of takings (January 4, 1896, and January 1, 1898)		6,154,766 84
		<u>\$22,243,663 40</u>

The outstanding Water Loans on this date, February 1, 1899, are as follows :

Loans.		Date of	Maturity.		Amount.
per cent.	Currency,	Due	April, 1899	.	.
6	"	"	Jan., 1901	.	\$250,000 00
6	"	"	April, 1901	.	625,000 00
6	"	"	July, 1901	.	688,000 00
6	"	"	July, 1902	.	330,000 00
5	"	"	July, 1902	.	100,000 00
	Sterling Loan,	"	Oct., 1902	.	1,947,273 98
	(£399,500)	"	April, 1903	.	905,000 00
6	"	"	Jan., 1904	.	8,000 00
6	"	"	April, 1904	.	38,000 00
6	"	"	Jan., 1905	.	161,000 00
6	"	"	April, 1905	.	142,700 00
6	"	"	July, 1905	.	44,000 00
6	"	"	Oct., 1905	.	6,000 00
5	"	"	Oct., 1905	.	1,000,000 00
6	"	"	Jan., 1906	.	82,550 00
6	"	"	April, 1906	.	8,750 00
5	"	"	April, 1906	.	552,000 00
5	"	"	Oct., 1906	.	2,000,000 00
6	"	"	Oct., 1906	.	4,000 00
6	"	"	Jan., 1907	.	8,000 00
6	"	"	April, 1907	.	5,000 00
6	"	"	July, 1907	.	1,000 00
5	"	"	Oct., 1907	.	1,000 00
5	"	"	April, 1908	.	12,000 00
4	"	"	April, 1908	.	588,000 00
4	"	"	July, 1909	.	82,000 00
4 $\frac{1}{2}$	"	"	Oct., 1909	.	268,000 00
4	"	"	April, 1910	.	280,000 00
4	"	"	April, 1912	.	324,000 00
4	"	"	July, 1913	.	111,000 00
4	"	"	Oct., 1913	.	336,000 00
4	"	"	Jan., 1914	.	466,000 00
4	"	"	April, 1914	.	18,500 00
4	"	"	Oct., 1914	.	16,000 00
4	"	"	Jan., 1915	.	50,000 00
3 $\frac{1}{2}$	"	"	April, 1915	.	50,000 00
4	"	"	April, 1915	.	145,700 00
3 $\frac{1}{2}$	"	"	Oct., 1915	.	50,000 00
4	"	"	Oct., 1915	.	23,000 00
3 $\frac{1}{2}$	"	"	Jan., 1916	.	100,000 00
4	"	"	Jan., 1916	.	58,000 00
4	"	"	April, 1916	.	128,500 00
3 $\frac{1}{2}$	"	"	July, 1916	.	75,000 00
3 $\frac{1}{2}$	"	"	Oct., 1916	.	25,000 00
4	"	"	Oct., 1916	.	286,300 00
4	"	"	Jan., 1917	.	21,000 00
3	"	"	April, 1917	.	200,000 00
3 $\frac{1}{2}$	"	"	April, 1917	.	275,000 00
4	"	"	April, 1917	.	161,000 00
4	"	"	July, 1917	.	7,000 00
4	"	"	Oct., 1917	.	160,700 00
4	"	"	Jan., 1918	.	20,000 00
4	"	"	April, 1918	.	6,300 00
3 $\frac{1}{2}$	"	"	July, 1918	.	100,000 00
4	"	"	Oct., 1918	.	100,000 00

Carried forward,

\$13,451,273 98

Loans.				Date of Maturity.	Amount.
<i>Brought forward,</i>					\$13,451,273 98
4	per cent.	Loan,		Due April, 1919 . . .	200,000 00
3½	"	"	"	" Oct., 1919 . . .	145,000 00
4	"	"	"	" Oct., 1919 . . .	300,000 00
3½	"	"	"	" Nov., 1919 . . .	130,000 00
3½	"	"	"	" Jan., 1920 . . .	220,000 00
4	"	"	"	" Oct., 1920 . . .	384,000 00
4	"	"	"	" April, 1921 . . .	100,000 00
4	"	"	"	" Oct., 1921 . . .	162,500 00
4	"	"	"	" Jan., 1922 . . .	100,000 00
4	"	"	"	" April, 1922 . . .	75,000 00
4	"	"	"	" Oct., 1922 . . .	283,000 00
4	"	"	"	" Oct., 1923 . . .	576,275 00
4	"	"	"	" Oct., 1924 . . .	644,225 00
3½	"	"	"	" Oct., 1927 . . .	150,000 00
3½	"	"	"	" Oct., 1928 . . .	200,000 00
Total					<u>\$17,121,273 98</u>

				SUMMARY.	
3	per cent.	Loans	. . . . .		\$200,000 00
3½	"	"	. . . . .		1,520,000 00
4	"	"	. . . . .		6,214,000 00
4½	"	"	. . . . .		268,000 00
5	"	Currency Loans	. . . . .		13,000 00
5	"	Gold	"		3,552,000 00
5	"	Sterling	"		1,947,273 98
6	"	Loans	. . . . .		3,407,000 00
Total					<u>\$17,121,273 98</u>

Cochituate Water Debt, Gross and Net,

At the Close of Each Fiscal Year.

Fiscal Year.	Gross Debt.	Sinking-Funds.	Net Debt.
1847-48	\$2,129,056 32 ¹	.....	\$2,129,056 32
1848-49	3,787,328 98	.....	3,787,328 98
1849-50	4,463,205 56	.....	4,463,205 56
1850-51	4,955,613 51	.....	4,955,613 51
1851-52	5,209,223 26	.....	5,209,223 26
1852-53	5,972,976 11	.....	5,972,976 11
1853-54	5,432,261 11	.....	5,432,261 11
1854-55	5,403,961 11	.....	5,403,961 11
1855-56	5,230,961 11	.....	5,230,961 11
1856-57	5,031,961 11	.....	5,031,961 11
1857-58	4,724,961 11	.....	4,724,961 11
1858-59	4,754,461 11	.....	4,754,461 11
1859-60	3,846,211 11	.....	3,846,211 11
1860-61	3,455,211 11	.....	3,455,211 11
1861-62	3,012,711 11	.....	3,012,711 11
1862-63	2,992,711 11	.....	2,992,711 11
1863-64	2,992,711 11	.....	2,992,711 11
1864-65	2,942,711 11	.....	2,942,711 11
1865-66	3,152,711 11	.....	3,152,711 11
1866-67	3,370,711 11	.....	3,370,711 11
1867-68	3,867,711 11	.....	3,867,711 11
1868-69	5,107,711 11	.....	5,107,711 11
1869-70	5,731,711 11	.....	5,731,711 11
1870-71	6,482,711 11	\$1,100,000 00	5,382,711 11
1871-72	6,812,711 11	1,185,049 67	5,627,661 44
1872-73	6,912,711 11	1,268,234 97	5,644,476 14
1873-74	7,863,711 11	1,372,953 62	6,490,757 49
1874-75	8,123,711 11	1,533,890 28	6,589,820 83
1875-76	9,735,711 11	1,560,917 83	8,174,793 28
1876-77	11,548,711 11	1,709,492 60	9,839,218 51
1877-78	11,545,273 98	2,043,764 73	9,501,509 25
1878-79	11,753,273 98	2,143,847 85	9,609,426 13
1879-80	11,697,273 98	1,771,692 92	9,925,581 06
1880-81	11,631,273 98	1,989,300 88	9,641,973 10
1881-82	11,631,273 98	2,281,857 89	9,349,416 09
1882-83	11,955,273 98	2,607,768 46	9,347,505 52
1883-84	12,882,273 98	2,746,505 58	10,135,768 40
1884-85	13,045,473 98	3,106,323 82	9,939,150 16
1885-86	13,491,473 98	3,335,201 26	10,106,272 72
1886-87	14,142,273 98	3,947,616 92	10,194,657 06
1887-88	14,741,273 98	4,373,304 09	10,367,969 89
1888-89	14,941,273 98	4,864,092 54	10,077,181 44
1889-90	15,696,273 98	5,440,819 47	10,255,454 51
1890-91	16,267,773 98	5,979,297 80	10,288,476 18
1891-92	16,423,773 98	6,471,545 34	9,952,228 64
1892-93	16,758,773 98	7,019,058 38	9,739,715 60
1893-94	17,055,273 98	7,649,504 87	9,405,769 11
1894-95	17,761,273 98	8,444,773 55	9,316,500 43
1895-96	18,261,273 98	9,099,966 39	9,161,307 59
1896-97	18,261,273 98	9,704,387 99	8,556,885 99
1897-98	17,911,273 98	9,852,760 01	8,058,513 97
1898-99	17,121,273 98	9,487,119 88	7,634,154 10

¹No account taken of amounts borrowed temporarily from 1846 to 1852 and afterwards funded by the issue of the water bonds that figure in this statement.

Cochituate Water Sinking-Fund Receipts.

[SINCE THE ESTABLISHMENT OF THE BOARD OF SINKING-FUND COMMISSIONERS IN 1871.]

Year.	From Tax Levy or City Income.	Interest on Investments.	Interest on Bank Deposits.	Water- Rates, etc.	Premiums on Loans.	Other Sources.	Totals.
1871. April 30, received from Committee on Re- duction of Debt.....	\$1,100,000 00	.....	.....	.....	.....	.....	\$1,100,000 00
1871-72.....	14,325 00 Taxes, 9,375 00	\$61,000 00	\$349 67	.....	.....	.....	85,049 67
1872-73.....	9,000 00	70,137 50	1,017 80	.....	.....	.....	80,155 30
1873-74.....	30,000 00	76,799 60	2,072 65	.....	.....	.....	108,962 25
1874-75.....	75,973 28	82,842 25	2,121 13	.....	.....	.....	160,936 66
1875-76.....	65,554 00	85,470 00	3,617 55	.....	.....	\$386 00	155,027 55
1876-77.....	234,814 00	86,245 66	4,119 47	\$26,480 18	.....	915 46	352,574 77
1877-78.....	Taxes, 214,500 00	85,830 85	10,809 31	27,099 92	.....	.....	338,240 08
1878-79.....	Taxes, 207,456 00	93,264 49	6,181 26	177,195 91	.....	9,874 21	493,971 87
1879-80.....	.....	90,472 42	5,687 62	214,707 24	.....	4,411 64	315,278 92
1880-81.....	86,460 00	167 32	195,668 90	1,762 04	284,058 26
1881-82.....	96,546 35	2,767 90	193,840 36	494 08	293,648 69

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1882-83.....	105,129 51	8,486 33	219,581 72	1,241 04	331,438 60
1883-84.....	138,120 90	2,268 22	141,362 12
1884-85.....	143,049 45	7,510 40	209,258 39	.....	.....	359,818 24
1885-86.....	156,694 01	5,804 31	120,129 12	.....	442 27	283,069 71
1886-87.....	181,264 89	2,644 70	297,928 95	.....	5,081 12	562,415 66
1887-88.....	199,883 90	4,178 16	221,620 11	.....	.....	425,682 17
1888-89.....	213,048 22	8,958 69	256,013 57	\$11,552 50	.....	489,572 98
1889-90.....	228,000 83	11,730 60	300,903 00	36,092 50	.....	576,726 93
1890-91.....	229,509 17	29,763 94	242,675 22	36,530 00	.....	538,478 33
1891-92.....	175,808 33	22,560 16	275,014 05	.....	78,865 00	552,247 54
1892-93.....	260,506 20	30,148 34	240,435 00	16,413 50	.....	547,503 04
1893-94.....	298,224 44	18,133 03	299,467 27	14,621 75	.....	630,446 49
1894-95.....	312,332 05	18,524 22	297,518 29	.....	9,894 12	638,268 68
1895-96.....	378,819 55	5,892 29	205,791 00	64,690 00	.....	655,192 84
1896-97.....	403,840 02	5,225 08	194,740 00	.....	616 50	604,421 60
1897-98.....	421,928 45	8,337 21	193,395 00	8,833 50	15,877 86	648,372 02
1898-99.....	417,142 02	5,806 85	193,395 00	.....	8,016 00	624,359 87
	\$2,037,556 28	\$234,884 21	\$4,599,858 20	\$188,733 75	\$137,877 34	\$12,377,280 84

DETAILED EXPENDITURES UNDER THE SEVERAL APPROPRIATIONS.

FEBRUARY DRAFT, 1898, TO FEBRUARY DRAFT, 1899.

Current Expenses, Extension of Mains, etc. (from Revenue).

Salaries :		
Commissioner	\$5,000 00	
Assistant Commissioner	3,000 00	
Secretary	3,000 00	
Employees	631,230 77	
		\$642,230 77
Water-pipes and castings		151,759 15
Lead and lead pipe		23,854 51
Travelling expenses and transportation of em- ployees		17,334 95
Blasting and excavating trenches		15,391 64
Tools, machinery, iron, steel and other materials for repairs and furnishing		14,392 54
Horses, purchase of	\$475 00	
Feed and board	5,191 37	
Shoeing and veterinary services	2,808 97	
Wagons, etc., and repairs of same	2,620 68	
Harnesses and repairs	2,102 32	
		13,198 34
Teaming and freights		8,635 76
Land damages		8,288 51
Repairs of buildings, streets and other structures, Fuel		8,127 27
New meters and repairs		7,533 70
Lumber		7,224 46
Printing		6,223 71
		5,726 53
Services and expenses of counsel in connection with settlement of claim against the State		4,662 51
Damages		3,837 61
Professional and expert services		2,648 57
Gravel and crushed stone		2,279 05
Inspection of castings at foundries		2,189 83
Report on property taken by the State		2,000 00
Stationery and postage		1,428 50
Sanitary at Chestnut Hill reservoir		1,348 00
Telephone service		1,314 73
Salt		1,054 67
Bricks		787 13
Board of injured man		782 17
Oils		728 48
Covering water-pipes with felting		707 50
Rents		675 00
<i>Carried forward</i>		\$956,365 59

<i>Brought forward</i>	\$956,365 59
Manure	533 00
Removing water-pipes from Federal street	528 00
Furniture	502 20
Cement and sand	500 69
Gas	496 53
Taxes	479 98
Water-proof clothing	335 34
Advertising	301 20
Examination of accounts	300 00
Electric lighting	275 50
Town of Brookline, temporary supply of water for West Roxbury	244 00
Suffolk Registry, recording papers	148 85
Drain-pipe	75 41
Ice	57 20
Salt hay	21 25
Water-rates, Framingham and Medford	19 48
	<hr/>
	\$961,184 22
Less amount transferred to new loan, Extension of Mains, etc.	152,601 63
	<hr/>
	\$808,582 59
Refunded water-rates	4,209 93
Sinking-fund payment	193,395 00
Interest on loans	841,792 52
Metropolitan water assessment	285,600 54
Proportion of water-rates paid under contract	9,088 07
	<hr/>
	<u>\$2,142,668 65</u>

From the above amount of \$961,184.22 should be deducted \$47,798.94, expended for corporations, etc., and \$14,557.91, expended upon portions of the system now held by the State, leaving the amount of \$898,827.37 as the total actual expenditure for current expenses and extension of mains, etc.

EXTENSION OF MAINS, ETC. (FROM LOANS).

Amount transferred from expenditures from revenue, as above	\$152,601 63
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Additional Supply of Water.

Land damages on account of Whitehall pond	<u>\$2,992 11</u>
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The balance of the appropriation for Additional Supply of Water on February 1, 1898, was \$300. To this balance was added a transfer of \$2,692.11 from the appropriation for Mystic Water Works, Land, etc. The balance of the latter appropriation, amounting to \$951.64, was transferred to the appropriation for Playground, North End.

Contracts Made and Pending during Year Commencing February 1, 1898, and ending January 31, 1899.

Contracts marked thus () are completed. Amounts marked thus (†) are for extra work.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1898.	Total.
1897. * Mar. 2,	Matthew E. Nawn	{ Teaming water-pipes for year ending March 15, 1898. }	{ 37½ cents per ton, short haul 88½ " " " long " }	\$3,161 04	\$1,199 65	\$4,360 69
* " 2,	William Curley	{ Brass and composition castings for year ending March 15, 1898. }	{ No. 1, 17½ cents per lb. No. 2, 14½ " " " " No. 3, 12 " " " " }	4,617 51	2,297 10	6,914 61
* " 22,	{ Coöperative Foundry Company, Lynn, Mass. }	Iron castings for year ending March 15, 1898. .	{ No. 1, 1½ cts. per lb. { Annulled No. 2, 1½ " " " May 28, 1897, }	1,790 50	53 31	1,843 81
* May 21,	Osgood & Hart.	{ Service box castings, class No. 1 Iron castings, class No. 2. Hydrant and gate frames and covers }	{ 2 cents per lb. 1½ " " " " 1½ " " " " }	2,373 95	22 94	2,396 89
* June 1,	{ Sessions Foundry Company, Bristol, Conn. }	Iron castings for year ending March 15, 1898. .	1½ cts. per lb.	16,518 78	6,026 55	22,545 28
* " 19,	A. J. Wellington.	{ Excavating pipe trench in South Hunting- ton avenue, Basewood, Floyd and Crow- ford streets, Roxbury. }	{ 30 cents per linear foot for exca- vation and back filling. \$2.25 per cubic yard for rock exca- vation }	710 55	909 68	1,620 23
* Aug. 26,	John O'Brien	{ Excavating and refilling pipe trench, Haley, Hinckley and Harrishoff streets, Roxbury, viz.: Digging and refilling trench, 5 feet below Earth excavation less than 5 feet below sub-grade Rock excavation and refilling. }	{ 30 cents per linear foot of trench.. 60 " " cubic yard \$2.75 per cubic yard }	411 00	378 46	789 46

* Sept. 22,	{ McNeal Pipe and Foundry Co., Burling- ton, N. Y. }	{ 15 tons 4-inch B pipe	@ \$16.03 per ton 2,000 lbs., esti- mated, \$16,030.....	7,848 29	8,884 04	16,732 33
	Total,	{ 200 " 6-inch " "				
		{ 150 " 8-inch " "				
		{ 100 " 10-inch " "				
		{ 535 " 12-inch " "				
		{ 1,000 "				
* " 22,	M. F. Sullivan	Building sanitary at Chestnut Hill Reservoir..	\$1,300, estimated .....	.....	1,348 00	1,348 00
* Nov. 8,	{ George H. Stoddard and Gardner T. Voorhees.. }	{ Covering 20-inch water-pipe on Cottage Farm bridge with additional covering of felt and rosin	\$225 .....	.....	225 00	225 00
* Dec. 9,	Thomas Burke.....	Blasting, Columbia road, Dorchester.....	\$9.00 per cubic yard .....	.....	26 10	26 10
* " 17,	" "	" Ritchie street, Roxbury	\$8.75 " " .....	.....	46 38	46 38
* Dec. 23,	John J. Kelley.....	{ Blasting, Patten, Rodman and Wachusett streets, West Roxbury	@ \$2.57 per cubic yard.....	.....	597 78	597 78
* " 28,	Thomas Burke.....	Blasting, Geneva avenue, Dorchester.....	@ \$2.74 per cubic yard.....	.....	272 63	272 63
1898.		{ Excavating and refilling water pipe trenches, Columbia road, Dorchester..... }	{ 55 cents per cubic yard for earth excavation and refilling.... \$1.49 per cubic yard for rock ex- cavation and refilling..... }	.....	3,365 04 + 1,676 78	5,041 82
* Jan. 5,	John C. Coleman & Son..	{ Blasting, Maple-street extension, West Roxbury	\$3.98 per cubic yard.....	.....	141 69	141 69
* Jan. 13,	John J. Kelley.....	Blasting, Bellevue street, Dorchester.....	3.50 per cubic yard.....	.....	85 05	85 05
* " 21,	James McLaughlin & Son,	{ Blasting, Wabon and Wabeno streets, Rox- bury..... }	2.35 per cubic yard.....	.....	133 01	133 01
* " 26,	O'Brien & Byrne.....	Blasting, Hillsdale street, Dorchester.....	4.09 per cubic yard.....	.....	172 80	172 80
* Feb. 23,	James McLaughlin & Son,	" Dudley street, Dorchester.....	2.49 per cubic yard.....	.....	61 01	61 01
* Mar. 9,	Thomas Burke.....	" Geneva avenue, Dorchester.....	1.88 per cubic yard.....	.....	89 86	89 86
* " 14,	Thomas Burke.....			.....	

Contracts Made and Pending during Year. — Continued.

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1898.	Total.
1897.		270 tons 36-inch pipe, Class A..... 500 " 24-inch " " A..... 150 " 24-inch " " B..... 830 " 20-inch " " A..... 100 " 20-inch " " B..... 850 " 16-inch " " A..... 410 " 12-inch " " A..... 980 " 12-inch " " B..... 230 " 10-inch " " B..... 500 " 8-inch " " B..... 760 " 6-inch " " B..... 20 " 4-inch " " B..... 5,600 tons pipe..... 100 " Special Castings.....	{ @ \$16.75 per ton, 2,000 lbs., estimated total of contract, \$97,100 } { @ \$33 per ton, 2,000 lbs., estimated total of contract, \$13,626.90 } { 721,000 lbs. @ 1.18¢ cents per lb., estimated total of contract, \$9,024 } { 640,000 lbs. @ 1.55¢ cents per lb., estimated total of contract, \$9,924 } { 34 cents per ton, short haul..... 74 cents per ton, long haul..... } { No. 1, @ 17½ cents per lb. = \$1,568 75 No. 2, @ 16 cents per lb. = 5,280 00 No. 3, @ 13 cents per lb. = 715 00 Total..... \$7,563 75 }	.....	\$83,678 75	\$83,678 75
Mar. 18,	{ Warren Foundry and Machine Company, Phillipsburg, N. J..... }					
Mar. 18,	{ Sessions Foundry Co., Bristol, Conn..... }	{ Iron Castings for year ending March 15, 1899. (Contract No. 1.)..... }		.....	12,004 56	12,004 56
" 18,	{ Mechanics' Iron Foundry Co., Boston, Mass. }	{ Iron Castings for year ending March 15, 1899. (Contract No. 2.)..... }		.....	9,613 45	9,613 45
" 18,	Matthew E. Nawn.....	{ Teaming water pipes and materials for year ending March 15, 1899. .... }		.....	1,528 47	1,528 47
" 30,	{ John H. McCafferty & Co. }	{ Composition Castings for year ending March 15, 1899. No. 1, 9,500 lbs. estimated No. 2, 23,000 " " No. 3, 5,500 " " Total..... 48,000 " "		5,209 45	5,209 45

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* April 9,	Coffin Valve Co.....	{ 4 36-inch valves, @ \$438.50 each..... 4 30-inch valves, @ 312.50 each..... 5 24-inch valves, @ 178.00 each..... { 10 20-inch valves, @ 142.00 each.....	\$5,314.....	5,314 00	5,314 00
April 18, modified, May 9,	{ Warren Foundry and Machine Company, Phillipsburg, N. J.....	{ 870 tons 12-inch B Water-Pipe. Contract of April 18, 1898, modified, viz.: 717 tons 12-inch B 250 tons 16-inch B (12-inch pipe to be delivered at Atlantic, Mass., Station.) 70 tons additional 16-inch B pipe or- dered July 26, 1898.....	{ @ \$17.60 per ton, 2,000 lbs., @ \$17 per ton, 2,000 lbs., @ \$17 per ton, 2,000 lbs., Total, \$18,059.20	15,696 80	15,696 80
* April 23,	Thomas Burke.....	Blasting, Cherokee street, Roxbury.....	\$3 per cubic yard.....	280 20	280 20
* May 20,	John F. Kelley.....	Blasting, Gould street, West Roxbury.....	\$3.19 per cubic yard.....	98 89	98 89
" 20,	John McShane.....	{ Hauling 12-inch water-pipes from Neponset Station for new line to Moon Island.....	@ 75 cents per ton of 2,240 lbs.....	477 81	477 81
* June 8,	James McLaughlin & Son,	Blasting, Magnolia street, Dorchester.....	@ \$2.20 per cubic yard.....	63 58	63 58
" 20,	John F. Kelley.....	Blasting, Inley road, West Roxbury.....	{ @ \$2 per cubic yard..... Contract taken from Kelley and completed by Thomas Burke for }	192 40 361 25	192 40 361 25
* July 5,	O'Rourke & Nelson.....	{ Removing 12-inch water main and fixtures in Federal street, between Kneeland street and Federal-street bridge, and de- livering same at Albany-street yard.....	@ 50 cents per linear foot.....	528 00	528 00
* " 18,	Thomas Burke.....	Blasting, Harold street, Roxbury.....	@ \$2.60 per cubic yard.....	118 82	118 82
* " 27,	"	Blasting, Half-Moon street, Dorchester.....	@ \$2.38 per cubic yard.....	318 21	318 21
* Aug. 8,	Coffin Valve Co.....	{ 5 5-inch Coffin gate-hydrants (for new pipe line to Moon Island).....	@ \$81 each.....	155 00	155 00

Contracts Made and Pending during Year. — *Concluded.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1898.	Total.
1898. Aug. 31,	H. P. Nawn.....	{ Blasting and removing rock from water- pipe trenches, Columbia road, Section 2, Dorchester..... }	@ \$2 per cubic yard.....	.....	\$1,276 00	\$1,276 00
* Sept. 19,	O'Rourke & Nelson.....	{ Laying 16-inch and 6-inch pipes in same trench, Columbia road, Dorchester..... }	@ \$1 per linear foot.....	.....	1,727 34	1,767 54
* " 22,	Thomas Burke.....	{ Removing 16-inch pipe..... }	@ 80 cents per linear foot.....	.....	+ 40 20	
* Oct. 1,	O'Rourke & Nelson.....	{ Blasting, Hewins street, Dorchester..... }	@ 3.75 per cubic yard.....	.....	107 25	107 25
" 10,	H. P. Nawn ...	{ Removing 20-inch water-pipes in Colum- bia road, Dorchester, between Upham's Corner and Edward Everett square, and delivering same at Albany-street yard, in good condition..... }	@ \$1 per linear foot, N. B.—Settle- ment of this contract included in the esti- mate, first and final, and payment made for contract dated Sept. 19, 1898, as noted above.	.....	.....	.....
" 11,	Thomas Burke.....	{ Rock excavation from water-pipe trench, Columbia road, between Quincy and Dudley streets, Dorchester..... }	@ \$2.00 per cubic yard.	.....	.....	.....
* " 11,	"	Blasting, Gayland avenue, Dorchester.....	\$4.50 " " " .....	.....	206 55	206 55
* " 19,	Patrick Cushing	" Devon street, "	\$2.38 " " " .....	.....	192 54	192 54
" 31,	"	" Magnolia square, "	\$3.40 " " " .....	.....	74 80	74 80
Nov. 26,	O'Rourke & Nelson.....	{ Removing 1,700 linear feet 12-inch pipe from Columbia road, and delivering same at Squantum, Mass..... }	\$4.00 " " " .....	.....	.....	.....
		{ Laying above pipe (1,700 feet) and 4,400 feet already delivered; total, 6,100 feet..... }	@ 43 cents per linear foot.	.....	.....	.....
			@ 55 " " " .....	.....	.....	.....

"	28,	H. P. Nawn.....	{ Blasting, Geneva avenue, Dorchester, be- tween Columbia road and Blue Hill ave.... }	@ \$2.00 per cubic yard.
Dec.	12,	Donovan & Co.	{ Stone and brick work for foundations for ice-house, East Boston, viz.: Stone in place, dry..... Brick-work, in mortar, in place	\$3.85 per perch. \$15.25 per M.
"	14,	Daniel E. Lynch.....	Blasting, Draper street, Dorchester.....	\$3.50 per cubic yard.
"	17,	John O'Brien.....	" Rockwell street, Dorchester	\$2.47 " " "
"	20,	Thomas Burke.....	" Potosi street, Dorchester	\$3.74 " " "
1899.	Jan. 4,	H. P. Nawn.....	{ Laying about 1,600 feet 36-inch water-pipe in Geneva avenue, between Columbia road and Washington street, Dorchester.. For earth excavated and refilled..... For refilling where rock has been exca- vated..... }	@ 75 cents per linear foot. @ \$1.00 per cubic yard. @ 25 cents per cubic yard.
"	20,	O'Rourke & Nelson.....	{ Laying about 3,000 feet 16-inch pipe in Co- lumbia road, South Boston	@ \$1.05 per linear foot.
"	24,	Thomas Burke.....	Blasting, Stanley street, Dorchester.....	@ \$4.00 per cubic yard.
"	25,	{ Warren Foundry and Machine Company, Phillipsburg, N. J..... }	{ 550 tons 30-inch pipe	estimated total of contract, \$93,561.50
			125 " 24-inch "	
			975 " 16-inch "	
			2,300 " 12-inch "	
			50 " 10-inch "	
			875 " 8-inch "	@ \$16.70 per ton }
			500 " 6-inch "	
			20 " 4-inch "	2,000 lbs.
			5,395 " pipe.....	@ \$33.00 per ton 2,000 lbs.
			105 " special castings.....	

In the appendices annexed hereto are submitted the reports of the City Engineer and the superintendents of the department. They furnish full details of the present condition of the works and what has been accomplished.

Respectfully,

JOHN R. MURPHY,
Water Commissioner.

APPENDIX A.

I.

BOSTON, February 27, 1896.

HON. JOHN R. MURPHY,

Water Commissioner of Boston :

DEAR SIR, — As requested by you, we have made an examination of the cash transactions of the Water Department of the city of Boston, and have reached the following conclusions. In the first place it may be well to give the reasons for the receipt and payment of money in the office of the Water Commissioners, and to describe as briefly as possible the methods pursued in the handling of it.

The system of "Money Deposits" in your department originated (by vote of the Water Board) because of losses incurred by the city through furnishing labor and material, and afterwards not being reimbursed for the outlay. The amount of money in each instance required for deposit is governed by rules made by the Water Commissioners — a fixed sum being required in some cases, in others the amount of work and material furnished forming the basis for the charge. These sums of money are held by the Water Department as security, pending the execution of the various jobs. Upon the completion of the work, and the payment of the bills therefor, the amounts which have been advanced are refunded upon application. For instance, to be more explicit, for "Service Pipes" (until recently) a deposit of \$20 has been required; for elevators, motor pipes, repairs of service pipes between street mains and street lines, and for sales of old materials, deposits have been required according to estimates. Recently the rule in regard to furnishing $\frac{3}{4}$ -service pipes has been changed, so that all that is now required is a deposit of \$10, for which amount the city guarantees to do the necessary work. The greater part though of the "Deposit Money" has been, and is, obtained from deposits upon "Main Pipes." In all instances before the main pipes are laid in a street the cost of the work is determined, as nearly as possible, and if the income will not equal 5 per cent. for five years, or 25 per cent. of the amount invested

by the city, the applicant is obliged to deposit the difference between the income assured and 5 per cent. for five years on the investment. As soon as the amount required is being guaranteed the city by increase of income, the amount of the deposits is refunded. If at the expiration of five years the amount received has not equalled the 5 per cent. necessary, the deficit is forfeited to the city. In addition to the sums derived from deposits as above stated, money is received from rents of houses and pastures, and from sales of grass and certain other odds and ends. This money, together with the balances of deposits on main pipes, and the money now received from service pipes, is turned over to the City Collector from time to time. As nearly as it was possible for us to determine, up to 1892, the average amount of money held by the Water Board was about \$5,000. Since that time the amount has averaged about \$15,000. The bulk of the money has been kept in either the First or the Central National Bank of this city, but no interest has been obtained upon it at any time from either of these banks. Upon an average balance of \$5,000 kept during the past year with the Beacon Trust Company, interest has been allowed, but we fail to see why interest was not secured by the Commissioners from the other banks, as it is the common custom to require interest on all funds of the city deposited in banks.

As the consequence of this neglect the city is poorer by many hundreds, if not some thousands of dollars.

The cash accounts of the Water Department have been kept by the Clerk of the Board, and he has had the entire care of the moneys, subject to the orders of the Commissioners. The bank deposits stand in his name as clerk, and he alone has the power to draw checks. Of his absolute fidelity we have, after close scrutiny, no question, but of the discretion of the members of the Water Board for the past twenty years, we have some. Only the faithfulness of the custodian of these funds has stood between the city and possible heavy losses, for at times the balance in his hands has been as large as \$25,000, and his accounts, until now, have not been audited for thirteen years. Furthermore, these funds, which should have remained untouched, except for the purposes for which they were established, have been used by the members of the Board for payment for current expenses. To be sure, the money so taken was afterwards returned at intervals by its repayment by the City Treasurer on vouchers, but the practice is pernicious and fraught with danger, and should be immediately discontinued. Doubtless some money is needed in the office for petty expenses, but a small contin-

gent fund would serve all purposes. The easy accessibility of so much ready money has apparently had a tendency to wastefulness, and a decided extravagance in expenditure has been the rule during the past few years. The deposit money should be used for no purpose whatever but for the redemption of the receipts outstanding against it.

The following table shows the amounts spent year by year since 1889 by the Water Boards for travelling and miscellaneous expenses, and are instructive by way of comparison. The miscellaneous expenses are chiefly for entertainment and expenditures in connection with trips to the water works :

	Travelling.	Miscellaneous.	Total.
1889-90	\$1,599 40	\$1,156 32	\$2,755 72
1890-91	976 93	1,129 39	2,106 32
1891-92	1,982 72	792 09	2,774 81
1892-93	2,332 08	1,077 70	3,409 78
1893-94	2,486 54	3,868 81	6,355 35
1894-95	3,988 83	4,300 48	8,289 31
1895-96	2,288 35	4,046 02	6,334 37
	\$15,654 85	\$16,370 81	\$32,025 66

Our examination of Mr. Swan's accounts has covered a period of about five years, and has been thorough, and we have adjusted and balanced his books up to the present time. We found very few errors, and everywhere indications of care and painstaking. He has in his possession all the money his books call for, and \$27.02 to spare. To be sure that all the money received from rents and sales of materials and forfeited balances on main pipe deposits, etc., had gone into the City Treasury, we checked all the items of such character for a period of three years from the books of the Clerk of the Water Department to the books of the City Collector, and found that every sum had been properly accounted for in that office. There are improvements that can and ought to be made in the methods of transacting this money deposit business and in the way of keeping the accounts, and about those matters, as you have requested, we will make suggestions later.

Our time has been so occupied with the investigation of the cash transactions, hereinbefore alluded to, that the thorough examination in the methods of the general books, which involve no money matters, directly, has been held in abeyance. We will look into that and report specifically. The

subject matter of these books is mainly the recording of bills of all material purchased for the department— all bills being rendered in duplicate, one of which, approved by the Board, goes to the City Auditor, and being, in due course, paid by the Treasurer.

Our opinion is that these books and methods can be abridged, much in the direction of simplicity, perspicacity and economy.

The methods of the "Income Division" will be looked into with the view of criticism, abridging, altering or improving, if such seems to be necessary. It would have been done this week, but the rush of business always attendant upon the last week in February, when the sixty days' grace expire, rendered the books practically inaccessible.

Very respectfully,

(Signed)

R. McLAUGHLIN AND
ANDREW STEWART.

II.

Boston, March 11, 1896.

HON. JOHN R. MURPHY,

Water Commissioner of Boston :

DEAR SIR, — Having completed our investigation of the cash transactions of the Income Division of the Water Department, formerly known as the Water Registrar's Department, we respectfully submit to you our report as follows :

The period covered by this examination began about the time the Water Department was divided by ordinance in 1890. By this division two departments, known respectively as the Water Income Department and the Water Supply Department, were created. The Water Board had charge of the Supply Department, and the Income Department was under the control of the Water Registrar, and thus the two distinct departments existed up to July 1, 1895, when the act consolidating the departments under the control of one Water Commissioner took effect.

Under date of February 27, we reported our conclusions as to the management of the cash affairs of the Supply Department, and the present report has reference only to the cash transactions of the Income Department.

At the time our investigation began, and up to June, 1892, Mr. Davis was Water Registrar, and the purposes for which deposits of money were received in his department were almost identical with those of the Supply Department, which were set forth in detail in our other report. The system and methods used in conducting this business during the above period were, in our opinion, very inadequate and most unbusinesslike. The balances of deposits due the city, and the balances due the depositors, should have been kept entirely separate, the former eventually to be sent to the City Collector's, and the latter held in the control of the Registrar, to be paid the holders of receipts upon application. Instead, the method pursued was to send the balances due the depositors — if they delayed at all about calling for them — as well as the amounts due the city, to the City Collector, and when the owners of the balances so treated, subsequently from time to time presented their receipts at the Registrar's office for redemption, they were paid apparently out of the money which the Registrar at the time happened to have on hand — funds really applicable, of course, to later deposits. At the conclusion of Mr. Davis's incumbency all the money in the office, which was composed chiefly of amounts, the final disposition of which had not at the time been determined, was dumped into the Collector's instead of being turned over to the incoming Registrar. The result of this was that all the balances due depositors at that time were tied up in the Treasurer's hands, their final resting place probably having been in the Sinking Fund. Thus Mr. Doherty began his term completely handicapped, with no money at all on hand to meet the claims of the holders of receipts with balances due them. In that condition the matter has remained to the present day, resulting of course in reproach being cast upon the department because of receipts presented not being honored, and in the loss, so far, to the depositors of the sums due them. To adjust these accounts accurately would require certainly weeks of time, and the amount involved is not large enough to warrant the required expenditure upon the part of the city. We think, though, that some arrangement should be made so that outstanding receipts could be redeemed upon presentation, and would suggest that the simplest way would be to have the holders of these old receipts render bills for the amounts due them, these bills to be paid out of the Water Department appropriation. We saw no evidence whatever of any dishonesty, and have reason to believe there was none, but the methods

pursued were such that confusion and annoyance were inevitable.

After Mr. Doherty became Registrar, which was in July, 1892, the question arose as to which department ought to receive deposits for pipes, etc., other than main pipes, and the matter was finally decided by the Water Board assuming control of these funds, so that from January, 1893, to July, 1895, all deposit moneys were received in the office of the Water Commissioners, and the moneys received by the Water Registrar were confined to amounts paid for the letting on and shutting off of water, and occasional sums for the use of water from hydrants for contractors or for travelling shows. For the six months or so that Mr. Doherty had the charge of the general money deposits of the Registrar's Department — though he had to begin under great disadvantages, as stated — there was an improvement in the system, and it was possible for us to prove the accuracy of his accounts to our entire satisfaction. Since July, 1895, when the Water Registrar's Department became the Income Division of the Water Department, there have been no receipts of money in that division except for letting on and shutting off water. For the six months ending December 31, 1895, the total amount received from these sources was only about \$1,000. The custom is to turn over these receipts to the City Collector once a week. Owing to the peculiar nature of this income we see no better way of collecting it than that now in operation, but would suggest that the money received in these ways be paid to the City Collector daily instead of weekly, and thus any danger of loss to the Water Department from the handling of it would be infinitesimal.

We will continue our examination into the other branches of the Water Department, as arranged, as rapidly as possible, and report our findings to you at our earliest convenience.

Very respectfully,

(Signed)

R. McLAUGHLIN AND
ANDREW STEWART.

III.

BOSTON, May 21, 1896.

HON. JOHN R. MURPHY,

Water Commissioner :

DEAR SIR, — We present you herewith our final report of the investigation of the book-keeping and accounting affairs

of the Water Department of the city of Boston, the same being supplementary to our reports to you of the twenty-seventh of February and eleventh of March, 1896.

GENERAL OFFICE.

The scheme of the books kept in the office of the Water Commissioner is very good, though it impressed us as being somewhat over-elaborated, yet as no information is furnished by the books that may not be desired at some time, we did not think it best to suggest much here in the way of change. These are the central books of the system of accounts of the Water Department, the books elsewhere being tributary to them, so that all matters pertaining to the finances of the department converge here. We made an audit of them for the period of one year, and were able easily to prove their correctness, one with another, and all with the Auditor. The work has been and is being admirably done. There is every evidence of this, and no evidence of anything else.

INCOME DIVISION.

We found the general system of work in this office satisfactory, but the application of it not altogether so. The books were more than sufficiently expansive in some ways, and yet lacked very desirable detail. Not enough attention had been paid, either, to the necessity of having the accounts tally with those of the Collector. The mass of detail in this office is something enormous, the books and papers dealing largely with matters of record and reference and schedules. We have made a careful survey of all things pertaining to this office, and feel satisfied that when the changes in methods and books contemplated by the Superintendent are made, — all of which have our hearty approval, — all necessary information will be easily obtainable. We think that the meter books kept by Mr. Freeman are not at all indispensable, as there are regular department books which deal with the same subject in an adequate manner.

EASTERN DIVISION.

At the headquarters of this division on Albany street, some of the most essential clerical work of the department is performed. The necessity for efficient service there is very great, and for this reason, and also because we soon discerned that important matters — especially during the past year — had been conducted in an unsatisfactory manner, we made a careful and critical examination.

The cause of the trouble, we think, was two-fold. First, an inadequate and clumsy system of keeping the stock account; and second, the removal or transfer of the chief clerk of the division. While Mr. Donnelly remained in charge no trouble occurred, on account of his special knowledge and skilful management; but the advent of an inexperienced man presaged the confusion of the past year. When one takes into consideration that the stock kept at the Albany-street yard is not only promiscuous, but so great in quantity as to be worth at the present time considerably over \$100,000, one sees readily that a good system steadily adhered to is indispensable. We have given much thought to this subject, and feel assured that if the methods formulated and explained by us are carried out there will be no more trouble about this matter, or it will certainly be reduced to a minimum. We have confidence in the ability and faithfulness of the new chief clerk and his assistants, and will be surprised if our prophecy is not speedily realized. As to the other matters at issue, we think it is only necessary to state that we have advised changes which will consolidate the accounts, and which will prevent needless repetition of work performed at the general office; thus saving valuable time and causing better service to be rendered. The system of keeping the pay-rolls not only in this division, but throughout the Water Department, we consider well conceived and well executed.

MYSTIC DIVISION.

This division having been recently absorbed by the Eastern Division — and being conducted at present as a branch of it — the conditions being similar, the same methods will apply. The amount of stock to be taken into consideration is comparatively small, amounting at present to about \$4,000 worth. We have made suggestions to the book-keeper in regard to the necessary changes, so that his books will be uniform with those of the Eastern Division, and having entire confidence in him, believe that in a short time he will have things in satisfactory shape.

CHESTNUT HILL.

At Chestnut Hill is the headquarters of the Western Division, and the system of book-keeping there is similar to that used in the other offices of the department, with such variations as are made necessary by some additional requirements. The accounts of the pumping-stations are kept there also, and much work in the way of tabulation of statistics is

required by the engineer for comparison and estimation. The amount of detail is considerable, but all clerical work is performed in a manner both conscientious and creditable. We saw little to criticise and much to commend.

In conclusion, we wish to say that we are satisfied that the changes you have personally made in the methods of transacting business, and which you requested us to examine, are all in the direction of increased efficiency, and will bear good results. We also think it only fair to say that, without exception, during this investigation, we have been treated with the utmost courtesy by the clerks of the Water Department, who have been more than willing, at all times, to render us all assistance in their power.

Yours respectfully,

(Signed)

RODNEY McLAUGHLIN AND
ANDREW STEWART,
Examiners of Accounts.

IV.

28 STATE STREET, BOSTON,
May 15, 1897.

HON. JOHN R. MURPHY,

Water Commissioner of the City of Boston :

DEAR SIR, — In compliance with your request I have made recently a survey of the books and accounting affairs of the Boston Water Department; this examination being supplementary to that made at your desire shortly after you became Commissioner. In a city department of such magnitude, with ramifications so numerous and extensive, no complete audit could be accomplished except by one with nothing but that to do. Therefore, my aim has been to see, so far as possible under the circumstances, if the accounting matters of the department were being conducted faithfully and honestly, to ascertain if the improvements suggested a year ago were being carried forward, and to discover the remaining imperfections in the system.

I am pleased to be able to say that I found a decided improvement all along the line, both as to methods pursued and the execution of them. In our report to you of the 27th of February, 1896, we said in regard to the use of money received from charges on account of service pipes, and deposits on account of main pipes, for current expenses, that "the

deposit money should be used for no purpose, whatever, but for the redemption of the receipts outstanding against it." This dangerous abuse, which had continued for years, has been abolished. The fund on the first day of May, 1897, amounted to \$21,913.37, which amount I found to be deposited in bank to the credit of the Water Department. In the past, interest on this fund had not been required of the banks holding it, but now is required, and about \$400 has been received from this source since you made that rule.

A year ago we called attention also to the great increase in the expenditures of money by the department for travelling and miscellaneous matters during the past few years, and by way of comparison I submit the following figures taken from the books :

	Travelling.	Miscellaneous.	Total.
1892-93	\$2,332 08	\$1,077 70	\$3,409 78
1893-94	2,486 54	3,868 81	6,355 35
1894-95	3,988 83	4,300 48	8,289 31
1895-96	2,288 35	4,046 02	6,334 37
1896-97	320 80	2,520 94	2,841 74

We said in our report to you of the 21st of May, 1896, in regard to the Income Division, that "we found the general system of work in this office satisfactory ; but the application of it not altogether so." This criticism could not be made at the present time, for there have been many improvements introduced, which have been intelligently designed, and are being faithfully carried out. For instance, now all applications for service pipes must be filed at the office of the general superintendent, and these applications must be made either by the owners of property or their authorized attorneys. Heretofore contractors, plumbers or any one could make applications, which system resulted in duplicate entries and consequent confusion.

Now all entries of assessments, abatements and rebates are footed up on the ledgers, and carried forward continuously, and may be very easily compared with the figures of the City Collector, and the meter accounts are so arranged that the quarterly accounts committed to the Collector can be quickly examined.

New books have been provided for the recording of necessary data in connection with the elevators and motors in service, and also new records of all fire pipes connected with

the water works, and a book has been opened which gives a summary of assessments, abatements, collections and outstanding balances. These are only some of the excellent improvements which have been made, resulting in placing this division upon a very satisfactory basis.

There is a question inherited from former administrations which, I am convinced, demands speedy settlement. For years it has been customary, if not obligatory, for the Water Department to do considerable work for other city departments, and also for corporations, in the way of laying water pipes and making changes in the locations of pipe lines, etc., the expense of the work performed belonging properly to the corporations and other city departments, whose operations necessitated these changes. Prior to 1894 the cost of such work was charged to the Water Department appropriation, and bills were rendered to the parties for whom the work had been done, and the amounts due having been paid to the City Collector, were credited to the Water Department, but were used for the benefit of the water sinking fund, and were, consequently, valueless thereafter, so far as application to the general work or maintenance of the department was concerned, for which purposes the moneys would have been used had they not been diverted on account of this work done outside the Water Department. Thus the cost of maintaining the department from year to year appeared to be greater than it really was because of these methods. In the year 1894 a large amount of this outside work having been done, particularly for the Park Department, some one whose stock of ingenuity was greater than his knowledge of book-keeping conceived the idea of having the bills for the work done offset by the payment of Water Department pay-rolls by the debtors from time to time to the amount of their obligations. While this scheme has had the desired effect of saving the appropriation from its former losses, it has been the cause of so impairing the accounts of the Water Department that they are absolutely misleading in certain ways. I believe these troubles can be remedied — and remedied they should be without question — by the passage by the City Council each year of an order allowing the moneys received by the city for outside work done by the Water Department to be appropriated and expended for the general uses of that department. I think this would reach the root of all the trouble, having not only the effect of keeping the appropriation intact, but also of making it possible to keep the books so that they shall show the exact transactions of the department. The only other alternative

I can think of would be a refusal to do any work not purely departmental work.

In reviewing the work of the year nothing has pleased me so much as the great reform in the important matter of the keeping of the stock account. In our report to you of May 21, 1896, we said that we found at Albany street "an inadequate and clumsy system of keeping the stock account." The truth of this statement had been completely demonstrated when, at our suggestion, you had an account of stock on hand taken shortly after you became Commissioner. The revelation made by this was almost startling, for while the books called for \$62,529.54 worth of stock, there was found to be on hand \$114,040.89 worth, — a difference of \$51,511.35. We formulated a system for keeping this account, and that it has been faithfully executed is proved by the fact that when account of stock was taken at the close of the fiscal year, \$120,485.81 worth of stock was found to be on hand, while the books called for \$119,912.77 worth, — a difference of only \$573.04. Further comment would be superfluous, I think, in the light of these figures.

Certain improvements ascertained to be essential have been made in the system of meter accounting. The old ways were well enough, so far as they went, but specific information about meters could not be obtained without much trouble and delay. The system has been expanded so as to cover these deficiencies. Take, for instance, the matter of repairs of meters. Meter repairs should be divided into three classes, — repairs in service, in the shops of the department, and in the factories of the makers. No correct nor satisfactory statement of the ultimate cost or the relative merits of meters could be obtained from the meter books, because of the absence of these vital details which could be obtained only by taking these divisions into consideration always. In the future, because of methods recently devised, it will be possible to give at short notice a complete record of every meter which may be owned by the department from the time of its purchase to the time of its condemnation. Furthermore, the correctness of all repair bills rendered by the meter companies will have to be vouched for by the foreman of the meter department, one of whose duties will be to know definitely the details of those repairs.

I notice that there is no "holiday" account kept upon the books, and as I do not think that the money paid on account of holidays should be charged to main pipe laying, or something else of that sort, just the same as if there had been no holidays, I would advise the opening of an account with

holidays on the maintenance book, so that their cost can be shown the same as the cost of anything else.

In the matter of work done for the department by outside teamsters I find improvements have been made which will serve as checks to dishonesty, should any be attempted.

For instance, heretofore, no record was kept of the outside teams employed on work for the department, except whatever memoranda the superintendents in charge kept for their personal use, they having had to vouch — and they alone — for the amount of bills rendered for outside teaming. Instead of this free-and-easy arrangement, it is necessary now for the driver of each team, in every instance, to secure a ticket from the foreman of the job where his team is employed, giving the particulars of the work performed. When the owners of the teams present their bills for payment, these tickets must be presented with the bills as vouchers, and in addition to this, as a further safeguard, the foreman must render a daily report to the department in which is given an account of what he has done, and among the different items of information which he furnishes is a statement of the number of hired teams used, and this also must correspond with the bill rendered. So, should fraudulent practices be attempted, they would be much more certain of quick detection. This is a fair sample of many improvements which have been made here and there, where there were weak spots, which it is not necessary for me to describe in detail. Unnecessary books have been eliminated and necessary books and papers have been added. Accounts have been condensed where practicable, but where greater detail seemed essential they have been amplified without hesitation, for there was too much trusting altogether to the hazard of people's memories heretofore.

Yours very respectfully,

(Signed)

ANDREW STEWART.

V.

28 STATE STREET, BOSTON,
September 10, 1898.

HON. JOHN R. MURPHY,

Water Commissioner of the City of Boston :

DEAR SIR, — In accordance with your desire, I have carefully reviewed the clerical work of the Water Department for the year 1897–98, and have also studied the operation of

the methods introduced by you to promote the efficiency of the book-keeping and general accounting of the department, and have the honor to report as follows:

I found on hand April 1, the amount of money — \$21,135.72 — required by the books for the redemption of the receipts given to people on account of deposits made by them for main and service pipe laying. This fund is not now, and has not been, used during your tenure of office for any purpose but the legitimate one for which it was created.

I said to you in my last report, under date of May 15, 1897, that "I notice that there is no 'holiday' account kept upon the books, and as I do not think that the money paid on account of holidays should be charged to main pipe laying, or something else of that sort, just the same as if there had been no holidays, I would advise the opening of an account with holidays on the maintenance book, so that their cost can be shown the same as the cost of anything else." This has been done as suggested.

I also said in the same report: "There is a question inherited from former administrations which, I am convinced, demands speedy settlement. For years it has been customary, if not obligatory, for the Water Department to do considerable work for other city departments, and also for corporations, in the way of laying water pipes and making changes in the locations of pipe lines, etc., the expense of the work performed belonging properly to the corporations and other city departments, whose operations necessitated these changes. Prior to 1894 the cost of such work was charged to the Water Department appropriation, and bills were rendered to the parties for whom the work had been done, and the amounts due having been paid to the City Collector, were credited to the Water Department, but were used for the benefit of the water sinking fund, and were, consequently, valueless thereafter so far as application to the general work of maintenance of the department was concerned, for which purposes the moneys would have been used had they not been diverted on account of this work done outside the Water Department. Thus the cost of maintaining the department from year to year appeared to be greater than it really was, because of these methods. In the year 1894, a large amount of this outside work having been done, particularly for the Park Department, some one whose stock of ingenuity was greater than his knowledge of book-keeping, conceived the idea of having the bills for the work done offset by the payment of Water Department pay-rolls by the debtors from time to time to the amount of their obliga-

tions. While this scheme has had the desired effect of saving the appropriation from its former losses, it has been the cause of so impairing the accounts of the Water Department that they are absolutely misleading in certain ways." These crude and unsatisfactory practices have been abolished, and the matter is now treated in a straightforward and business-like way.

The general clerical work of the Commissioner's office I found to have been conducted as heretofore in a creditable manner.

At the office of the Distribution Division, formerly the Eastern Division, on Albany street, the accounting affairs have been further systematized, so that now there is order and method and discipline where I found two years and a half ago certain conditions bordering on the chaotic.

The gain noted last year in the keeping of the complicated stock account has been held; and, indeed I saw no sign of any backward step in any direction.

As to the Income Division of the Water Department, I wish to say that the changes and new methods initiated last year have all proved to be practicable and in the line of progress. The gain, though, in the keeping of the meter accounts has been really noteworthy.

On August 28, 1897, the Meter Service was consolidated with the Income Division, thus bringing under the charge of this division all work of setting, repairing, taking out, changing and testing of meters. In order to bring the Meter Service branch of the department to a proper degree of efficiency it was necessary to make a number of changes in the methods of handling the business, a few of which I mention below.

A competent man was placed in full charge of field work, such as applying, changing, repairing in service and taking out of meters, and the same sort of man was placed in full charge of all shop work, provided with the necessary authority and assistance to procure good repair work and accurate tests.

A system of thorough examination of all meters coming into shop, both from factory and from service, was established, also a system of thorough examination, repairing and cleaning of meter registers in shop, thus reclaiming a large number of registers that had been thrown aside.

A system of repairing meter register boxes, glasses and seals and of keeping the same in proper repair was organized, thus insuring meters against improper interference either by persons connected or not connected with the service, and also

a system of checking the readings of meter registers going to or coming from service, thus assuring accuracy in water takers' bills.

The capacity of the shop for repairing, testing and adjusting meters was enlarged, and meters are now repaired in shop at less cost than was involved by the old method of sending them to the factory, and many meters have been reclaimed that had been condemned.

These are illustrations of the improvements made during the past year in the working of the Meter Service, and will convey some idea of the great gain made during that period.

As to the card system of meter accounting, instituted some months ago, I have nothing to say, after a careful inspection of it, but words of commendation. It has already proven itself to be a great advance upon the former method of book accounting.

As an effect of the improved systems, it soon became evident that the hydraulic elevators and motors in use in this city had been running for some years practically unsupervised, with defaced clocks, leaky joints, valves and cylinder heads neglected, and, futhermore, that nothing was being done towards verifying the accuracy of the clocks. Accordingly, during the past year, a complete inspection of all elevators in use in the city was made, and it was found that the elevator cylinders were of varying dimensions and numerous in character and make; that many of the attached clocks were of obsolete patterns, and were located often in inaccessible places, and that the clocks were constantly breaking down^g by reason of long service and crude repairs, thus causing them to become inoperative. Of these facts no records were formerly kept, and so far as known the owners were never requested to make repairs.

In order that the department might possess positive knowledge of the actual condition of affairs, all data obtained through the above-mentioned inspection was recorded in a book provided for that purpose. The displacement of each elevator cylinder was carefully computed and the registration of the clock compared therewith, and out of some 465 elevator cylinders in the city only four were found to be correct, all others showing either gains or losses to the department. In cases where the registration of a clock was found to be incorrect the owners were requested to have the same adjusted, and all defective clocks have been replaced by new ones, also leaks and defects in mechanism have been remedied, thus preventing waste of water. At present, for the first time in

the history of the Boston Water Department, there is in the possession of the city a complete record of each elevator and the displacement of its cylinder, and all elevator clocks have been adjusted to practical accuracy.

Then, as to fire-pipes, it was found that the records relating to the fire-pipe service of the city were about worthless as records. If any inspection of the numerous systems and their valves and outlets was made, no record was kept of it. There has been established a system of inspection of fire-pipes by which some 5,000 valves and hydrants are regularly inspected and kept sealed and tagged, and something resembling a recognition of the rules of the Water Department by property-holders is now observable. A system of permits for breaking seals on fire-pipes, requiring that no seal be broken without first obtaining a permit, has been adopted, and the department is thus enabled to follow all cases of unsealed valves until they are again resealed.

That so much has been accomplished in so short a space of time is abundant testimony to the willingness and faithfulness of the employees of the Water Department, when properly and intelligently directed. And in this connection I trust that you will permit me to say, what I very much desire to say, that in the two years and a half that I have been going in and out of your department, consulting with you as to its needs and making suggestions as to the improvement of its accounting transactions, I can think of no reform suggested that you have not had executed in its letter and spirit. That the books and accounts of the Water Department are to-day in a condition so admirable is owing solely to your resolution to have them placed upon a businesslike basis, regardless of all difficulties in the way.

Yours respectfully,

(Signed)

ANDREW STEWART,

Examiner of Accounts.

VI.

28 STATE STREET, BOSTON, October 10, 1898.

HON. JOHN R. MURPHY:

DEAR SIR,— As requested by you, I have looked into the matter of dispensing with books relative to the keeping of the meter accounts of the Water Department, at the office of the General Superintendent of the Income Division, and

would say that I think the card system at the Distribution Division on Albany street yields all of the information necessary, and that the keeping of books for this purpose at the office in City Hall would be a work of supererogation. Furthermore, I think it would be well to test the card system fully, and that can be done best by letting it stand alone. Should it prove in any way unequal to what is expected of it, we could then take into consideration the keeping of supplementary books, but my own opinion is that the card system will prove sufficiently elastic to meet any reasonable expectation.

Yours very truly,

(Signed)

ANDREW STEWART.

VII.

28 STATE STREET, BOSTON, April 15, 1899.

HON. JOHN R. MURPHY,

Water Commissioner of the City of Boston:

DEAR SIR,— At your request I have made an examination of the expenditures of the Water Department for the fiscal years 1895–96 to 1898–99, inclusive, the figures for the purpose having been obtained from the reports of the City Auditor and the Water Department reports for the above-mentioned period. I submit to you herewith my finding in the matter:

EXPENDITURES OF THE BOSTON WATER DEPARTMENT.

1895–96 to 1898–99, inclusive.

1895–96.

Current expenses (Auditor's Report, pp. 137, 138) . . .	\$610,101 70
Extension of Mains, etc. (Auditor's Report, p. 141) . . .	251,984 94
Additional Supply (Auditor's Report, p. 140) . . .	382,819 01
	<hr/>
	\$1,244,905 65
Paid on account of work done for corporations, etc. . .	18,648 71
	<hr/>
Total	\$1,226,256 94

1896-97.

Current expenses (Auditor's Report, p. 151) . . .	\$591,550 42
Extension of Mains, etc. (Auditor's Report, p. 153) . .	232,142 98
Additional Supply (Auditor's Report, p. 153) . . .	217,070 45
	<hr/>
Paid on account of work done for corporations, etc. (Second Annual Report Water Commissioner, pp. 11-13)	\$1,040,763 85
	<hr/>
Total	\$1,023,397 71

1897-98.

Current expenses (Auditor's Report, p. 164) . . .	\$623,476 51
Extension of Mains, etc. (Auditor's Report, p. 165) . .	281,782 32
Additional Supply (Auditor's Report, p. 165) . . .	179,879 01
	<hr/>
Paid on account of work done for corporations, etc. (Third Annual Report Water Commissioner, pp. 13, 14),	\$1,085,137 84
	<hr/>
Total	13,300 73
	<hr/>
Total	\$1,071,837 11

1898-99.

Current Expenses and Extension of Mains — one appropriation — (Auditor's Exhibit, January 31, 1899, p. 19), From loan of \$200,000, issued November, 1898, for Extension of Mains (Auditor's Exhibit, January 31, 1899, p. 17)	\$808,582 59
	<hr/>
	152,601 63
	<hr/>
	\$961,184 22
Paid on account of work done for corporations, etc. . .	47,798 94
	<hr/>
Total	\$913,385 28

The amounts expended during the above years upon portions of the Water Department system now held by the State, estimated as closely as possible, are as follows:

1895-96	\$233,482 98
1896-97	200,608 84
1897-98	168,862 83
1898-99	14,557 91

The amount for the year 1898-99 (\$14,557.91) subtracted from the total amount as stated (\$913,385.28) would leave \$898,827.37 as the net expenditure for that year.

The total amount for the year 1897-98, that is, including the amounts paid on account of portions taken by the State, was \$1,071,837.11, showing a difference of expenditure between the two years of \$173,009.74, caused by the loss to the city of those portions of the department taken by the State.

Yours very truly,

(Signed)

ANDREW STEWART.

VIII.

28 STATE STREET, BOSTON, MASS., May 22, 1899.

HON. JOHN R. MURPHY,

Water Commissioner of the City of Boston :

DEAR SIR, — In accordance with your desire, I made during the past weeks a survey of the accounting affairs of the Water Department for the fiscal year 1898–99, and herewith submit to you my report of the same.

I found on hand the amount of money — \$18,114.74 — required by the books for the redemption of the receipts given to people on account of deposits made by them for main and service-pipe laying.

This fund is not now, and has not been, used during your tenure of office for any purpose but the legitimate one for which it was created.

The general clerical work of the Commissioner's office I found to have been conducted as heretofore in a creditable manner.

At the office of the Distribution Division on Albany street the accounting affairs have been still further systematized, and the business of the division is being conducted in a very orderly and methodical manner, all of the improvements which I noted in my report to you last year having been held and many others having been consummated, some of which, as follows, are worthy of specification.

The system of accounting for the expenditure of the yearly appropriations in vogue heretofore, consisted in charging the money expended in labor and stock to one or more of the many subdivisions into which the work of the department is classified. These subdivisions were not specific enough to give one a comprehensive idea of the cost of certain kinds of work; for instance, the main pipe work was formerly separated into three subdivisions, viz., Extension, Relaying and Repairs. Originally the term "relaying" was intended to cover the work of renewing mains worn out in service, but for want of a broader term it became the custom to charge under this heading, not only the work of renewing the old mains worn out in service, but also the replacing of mains insufficient to supply the demand made upon them by those of a larger diameter, relocating mains in the way of some public improvement, and raising or lowering mains to conform with new grades. Now these different kinds of work are provided for under the heading "Changes, Renewals and

Improvements," which give opportunity for proper and correct analysis.

Furthermore, the term "extension" now represents upon the books of the department what it was meant to represent, namely, the linear extension of the system, and not in any way the diametrical extension.

All kinds of hydrant work were formerly designated by the title "Hydrant Repairs;" now this work is classified under the headings "New Hydrants," "Changes in Style and Location" and "Repairs." When water was delivered through hydrants to contractors the labor was charged wrongly, for want of a proper subdivision, to "Hydrant Repairs." The labor should have been charged to the "Collection of Water Revenue," and that is what is being done now.

Service-pipe work was formerly divided into two classes, viz., "New Services" and "Service-Pipe Repairs," and a most important element of service-pipe work, namely, the changing of size and location, was not accounted for separately, but was included in one or the other of these two subdivisions. A subdivision covering this sort of work is now provided.

Work done on water-posts was formerly charged under "New Services" or "Service-Pipe Repairs." It is now accounted for in a class by itself, and the considerable amount of work done on this order of fixture is properly exhibited.

The accounts necessary because of fountains were imperfect, for the indefinite term "Fountain Repairs" had to cover everything. Now the divisions comprise "New Fountains," "Changes in Style and Location," "Furnishing Ice for Fountains" and "Fountain Repairs."

As to the expenditures of the department on account of holidays, sickness, etc., much has been accomplished in the right direction.

Each foreman is now supplied with a time-book containing all the subdivisions, so arranged as to allow of his charging the smallest fraction of a day to any particular kind of work. Formerly, outside of the Yard, nothing but a plain time-book was used, showing only whether a man worked or not, and giving no idea as to the kind of work on which he was employed.

Overtime was formerly given to men on their simple statement that they had worked so many hours overtime, said statement, of course, approved by some one in authority, who must have depended upon his memory largely as to the correctness of the same. Now, before payment, the charges are checked with a report of the work done, and must correspond

with the labor on the report. This method not only checks the overtime, but also insures a correct report, that is as far as the labor is concerned. It was not uncommon heretofore to have the overtime paid omitted from the report of the work, and if the work was chargeable the charge, based upon the report, was, as a matter of course, insufficient, and the department was underpaid for its work.

As to the stock accounts, which in the past were the prolific cause of untold annoyance and anxiety, the gain noted last year has been more than held.

Heretofore the teamsters were not obliged to show a receipt for the stock which they took from the Yard. Now they are given a blank receipt, which must be returned signed by the foreman in charge of the work for which the stock is intended, which certifies to the receipt of the stock. The time that the teamster leaves the Yard is noted by the Yardmaster on the blank. The time that he arrives with the stock where the work is being done, and the time he leaves there to return to the Yard, is noted by the foreman of the job, and the time he finally arrives in the Yard is noted by the Yardmaster, thus giving a correct record of his movements and showing the total amount of time consumed in delivering the goods, thus making it easy to discover any attempt on the part of the teamster to kill time.

Those in charge of the outlying yards have been given receiving and delivery books in which they are to record the receipt and delivery of *everything* going in or out of their yards. This makes it possible to check the statement of "stock used" on their reports of work done. A special stock account with each of the outlying yards and the "service-pipe gang" is being kept, and at the end of the year it will be possible to tell just how much stock on hand each should have.

Heretofore the work of the carpenter and machine shops was reported in a rather general way, which gave no idea of the cost of any particular job. Now the almost innumerable jobs, varying in magnitude from the construction of a building complete to the sharpening of a knife or the driving of a nail, is reported in detail, showing the exact cost of each. This, of course, entails considerable work and greatly increases the amount of record matter.

Up to the present year the records of the different kinds of work performed by the department were crowded into about five books, and to one unacquainted with these books it was a difficult matter to find the details of work done. During the past year the records have been classified and books made

that are adapted in every particular to each class of work. This elaborate system was formulated as a result of a thorough investigation and progressive treatment of the requirements of the department.

I think it nothing but just to say here that for the good work accomplished in the Distribution Division, as stated, the Chief Clerk and his assistants are deserving of great credit, for without their earnest and intelligent diligence and faithfulness but a very small part of the things done in such a short time could have been done.

As to the Income Division, including the Meter Service Division of the Water Department, I found that the improvements in methods and systems noted in my report to you of 10th of last September had all been adhered to and are proving satisfactory.

Yours very truly,

(Signed)

ANDREW STEWART.

Examiner of Accounts.

APPENDIX B.

REPORT OF THE INCOME DIVISION.

CITY HALL, BOSTON, February 1, 1899.

HON. JOHN R. MURPHY,

Water Commissioner :

SIR, — Herewith please find annual report of the Income Division, Water Department. The reports of the Meter Service and the Deacon Service cover the financial year ending January 31, 1899; the balance of the report is rendered for the calendar year ending December 31, 1898, it being impracticable, owing to the nature of the accounts, to render an entire report for the financial year.

The contracts to supply water to the cities of Chelsea, Somerville and Everett were annulled by the Metropolitan Water Act on January 1, 1898, which fact necessarily reduces the grand totals representing the work performed by the Income Division, as compared with former years.

Respectfully submitted,

J. H. CALDWELL,

General Superintendent Income Division.

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Table I.*Showing Number of Water-takers during 1898.*

	Number.
Water-takers by annual rates	99,835
Water-takers by meter rates	5,650
Total number of takers	105,485

Table II.*Showing Kind and Number of Fixtures in use January 31, 1899.*

	Number.
Bath-tubs	65,391
Bowls	103,754
Foot-tubs	356
Sinks	170,087
Taps	25,438
Urinal, automatic	5,001
“ otherwise	586
Wash-tubs	100,598
Water-closets	146,510
Total fixtures	617,721

Table III.
Water by Annual Rates.

STYLE OF PREMISES.	Number of Premises.	Amounts Assessed.
Armories.....	4	\$152 00
Bakeries.....	273	3,617 42
Bath-houses.....	5	191 50
Building purposes.....	1,210	11,750 03
Cemeteries.....	12	160 00
Churches.....	245	2,868 33
Clubs.....	162	2,316 79
Depots.....	46	913 51
Disinfectant.....	1	25 00
Dwelling-houses.....	54,829	791,941 40
Fire Department:		
Chemical engines.....	12	180 00
Combination wagons.....	6	83 33
Hydrants and reservoirs.....	7,066	105,990 00
Ladder companies.....	17	255 00
Steam fire-engines.....	43	1,075 00
Hose companies.....	1	15 00
Water towers.....	1	15 00
Filling tanks (special).....	2	212 37
Flooding rinks.....	2	65 86
Fountains.....	33	555 08
Freight-houses.....	15	143 50
Green-houses.....	67	1,201 50
Gymnasiums.....	2	544 00
Halls.....	142	2,128 12
Hand-hose.....	8,680	43,400 00
Hospitals.....	58	4,210 00
Hotels.....	5	596 00
Laundries.....	578	10,713 42
Libraries and museums.....	1	10 00
Manufactories.....	15	425 86
Model houses.....	9,467	200,584 79
Morgue.....	1	10 00
Motors.....	10	110 00
Offal stations.....	2	225 00
Offices.....	1,621	14,516 16
Photograph rooms.....	37	720 11
Police stations.....	7	130 00
Public buildings.....	9	408 00
Public institutions.....	5	8,682 00
Puddling trenches.....	41	754 33
Restaurants and lunches.....	490	7,815 73
Saloons.....	572	21,286 20
Schools.....	131	1,882 50
Sewers (building), account 1897.....	1	1,780 38
Sewers (building), account 1898.....	1	5,196 18
Sewers (flushing).....	1	500 00
Shops.....	3,042	26,223 57
Shipping.....	33	1,525 47
Stables.....	4,021	27,959 72
Steam-engines.....	161	5,145 01
Steam-rollers.....	6	150 00
Steam-crushers.....	5	125 00
Stores.....	6,590	65,648 45
Theatres (special).....	5	204 12
Urinals (public).....	15	545 00
<i>Carried forward</i>	99,807	\$1,377,882 74

Table III. — *Concluded.*

STYLE OF PREMISES.	Number of Premises.	Amounts Assessed.
<i>Brought forward</i>	99,807	\$1,377,882 74
Ward-rooms.....	9	90 00
Washing-carts.....	3	100 00
Watering streets.....	16	50,879 89
Totals	99,835	\$1,428,952 63

Table IV.

Water by Meter Rates.

STYLE OF PREMISES.	Number of Premises.	Quantity of Water Consumed. Cubic Feet.	Amount Assessed.
Bakeries.....	17	1,371,000	\$1,782 20
Bath-houses	17	2,306,000	2,932 50
Boarding-houses	67	4,193,000	5,386 60
Bottling	55	4,302,000	5,270 70
Breweries	29	30,618,000	37,714 10
Cemeteries	1	313,000	398 60
Chemicals	9	1,371,000	1,742 60
Club-houses	28	5,016,000	6,356 60
Chutes	1	638,000	789 60
Distilleries	5	1,055,000	1,331 80
Electrical companies	18	24,013,000	29,798 05
Elevators and motors	515	52,002,000	66,965 71
Factories	241	52,105,000	57,497 55
Fish-houses.....	28	1,528,000	2,056 20
Gasworks	14	13,384,000	14,331 20
Greenhouses	11	701,000	973 90
Halls	17	2,269,000	2,873 70
Hospitals.....	12	11,871,000	13,761 70
Hotels	122	56,189,000	69,620 60
Iron-works	47	7,249,000	9,370 00
Laundries	26	7,674,000	9,977 80
Markets	5	249,000	367 10
Mills and engines	76	10,652,000	16,092 60
Model houses.....	1,045	68,953,000	89,815 26
Navy Yard and barracks.....	4	6,115,000	6,729 00
Offices, stores and shops.....	1,263	117,474,000	152,879 20
Oil-works.....	8	641,000	840 90
Parks	11	2,037,000	2,590 60
Police stations.....	16	1,820,000	2,491 80
Public institutions.....	29	21,120,000	25,861 40
Saloons and restaurants.....	331	26,081,000	34,685 90
Schools.....	150	14,232,000	20,307 70
Slaughtering houses.....	4	1,610,000	2,031 70
Stables	343	15,255,000	21,263 96
Steam and street R.R. companies	71	139,048,000	131,113 90
Stone-works	6	1,285,000	1,598 50
Sugar refineries.....	1	25,571,000	22,080 80
Tanneries	3	265,000	356 00
Theatres	14	2,856,000	3,649 40
Warehouses	14	2,507,000	3,279 20
Wharves and shipping.....	76	26,959,000	33,694 70
Totals	4,750	764,898,000	\$912,667 33

Table V.

Number and Amounts of Abatements Allowed during the Year 1898.

ON ACCOUNT OF ASSESS- MENTS FOR YEAR.	COCHITUATE.		MYSTIC.							
	Boston, excluding Charlestown.*		Charlestown.		Chelsea.		Somerville.		Everett.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
1898.....	3,283	\$22,102 64								
1897.....	1,973	18,837 40	101	\$912 15	157	\$1,201 40	475	\$2,855 87	247	\$1,428 25
1896.....	3	213 20	2	15 00	3	15 00	4	18 00	2	23 20
1895.....	215	1,169 24	1	5 00	1	5 00				

Total Cochituate.....\$42,322 48.

Total Mystic.....\$6,478 87.

* Abatements on account of 1898, in this column, include Charlestown, the Mystic water contracts having been abrogated January 1, 1898, by the Metropolitan Water Act.

The abatements allowed on account of 1898 assessments, amounting to \$22,102.64, were due to changes in occupancy of premises, changes in ownership, vacancies, errors in valuations and assessments, inaccuracy of meters as proved by tests, underground leaks for which the owner could not be held entirely responsible, and for other reasons, which, in the judgment of the General Superintendent, entitled the water-taker to consideration.

The abatements on account of 1897, 1896 and 1895, were due to bills uncollectible, changes of ownership, failures, shut-off for non-payment and cleaning up old accounts.

Table VI.*New Elevator, Motor, Fire and Service Pipes.*

Elevator pipes.....	19
Motor pipes.....	8
Fire pipes.....	29
Service pipes.....	2,038
Total	2,094

Table VII.*Turning Water Off and On.*

For repairs in mains.....	1,207
“ “ “ services.....	3,827
“ non-payment of water bills	3,307
“ waste.....	21
Turning on first time	1,804
Vacancies.....	3,587
Total	13,753

Table VIII.*Off and On Receipts.*

Received for turning water off and on for repairs, deposited with City Collector.....	\$1,842 00
--	------------

Table IX.

ELEVATOR, MOTOR AND FIRE PIPE SERVICE, FOR YEAR ENDING
DECEMBER 31, 1898.

Elevators.

Total number of hydraulic elevators in service December 31, 1898	505
Elevators in service operated by steam or electricity	37
<hr/>	
Total number of elevators under supervision of Water Department, December 31, 1898	542
New elevators inspected, measured and accepted	23
Elevators changed from water to electric power	19
Elevators discontinued, owing to buildings being demolished	6
Elevators discontinued, owing to vacancies	44
Elevator cylinders measured and clock compared	199
“ clocks readjusted to accuracy	133
“ clocks and cords repaired	54
Elevator clocks specially inspected after realterations	80
Elevator cylinders exchanged for other makes	3
Elevator cylinders or valves found leaking and repaired	23

Motors.

Total number of hydraulic motors in service	113
New motors applied to service during 1898	5
Motor clocks repaired	3

Fire Pipes.

Buildings equipped with fire-pipe service	408
Visits made to premises	954
Fire outlet valves inspected	4,004
Fire outlet valves sealed and resealed	2,375
Hydrants inspected	126
Hydrants resealed	51

METER SERVICE.

Realizing that the condition of the meters in service is a matter of vital importance, both to the department and to the water-taker, a great amount of careful work has been done by the Meter Service during the past year. The amount of work performed upon meters is much increased over former

years, which fact is not shown by a greater number of operations, but rather by the quantity and quality of the work performed upon each meter undergoing repairs at the Department shop being greatly increased and improved. Meters, when prepared for service are much more accurate than formerly, and their condition is such that they will not need repairs nor adjustment for years, barring unpreventable accidents.

The effect of the present methods of examinations, tests and repairs is already apparent, and will increase as the present system embraces all the meters in service, and the efficiency and accuracy of meters in service will then be advanced to a degree which has heretofore been deemed unattainable.

The work of the Meter service is set forth in the following tables :

Table X.

Statement of Meters for Year ending January 31, 1899.

Meters belonging to department, January 31, 1898 .	5,300
Purchased during year	25
In stock, not reported last year	8
	<hr/>
	5,333
Condemned during year	33
Lost in service during year	5
Sold	17
	<hr/>
	55
Meters belonging to department, January 31, 1899,	<hr/>
	5,278
	<hr/>

Table XI.

Distribution of Meters, January 31, 1899.

In service	4,752
At department shop	31
At factory for repairs	495
	<hr/>
	5,278
	<hr/>

Table XII.

General Statement of Work Performed on Meters during Year ending January 31, 1899.

	Meters.	Boxes.
Applied.....	411	90
Discontinued	593	
Changed.....	1,176	
Changed locations	31	
Tested	3,160	
Repaired at shop	1,095	
" " factory	462	
" in service.....	1,442	167
Abandoned.....		33
Examined	541	
Hayed boxes....		1,429
Lost in service.....	5	
Sold.....	17	
Condemned.....	33	
Meters at factory	31	
" in service	4,752	
Purchased	25	
Meters at department shop	495	
" in stock, not reported last year	8	
Private meters applied to department service	18	
" " in department service.....	71	

Table XIII.

Meters Condemned.

	DIAMETER IN INCHES.						Totals.
	3	2	1½	1	¾	⅝	
Worthington.....	1	5	1	13	6	2	28
Metropolitan ...					2		2
Crown						1	1
B. W. W.					2		2
Totals.....	1	5	1	13	10	3	33

Table XIV.

Meters Applied.

	DIAMETER IN INCHES.							Totals.
	4	3	2	1½	1	¾	⅝	
Worthington	5	1	7	13	30	24	.....	80
Crown.....	10	8	9	13	33	36	133	242
Metropolitan.....	.....	.....	.....	2	7	36	.....	45
Hersey .....	.....	.....	3	6	6	7	.....	22
Thomson.....	.....	.....	.....	.....	.....	3	3	6
B. W. W.....	.....	.....	.....	.....	.....	4	.....	4
Lambert .....	.....	.....	.....	1	2	2	4	9
Gem.....	1	.....	.....	.....	.....	.....	.....	1
Nash .....	.....	.....	.....	.....	.....	2	.....	2
Totals	16	9	19	35	78	114	140	411

Table XV.

Private Meters Applied to Department Service.

	DIAMETER IN INCHES.						Totals.
	6	2	1½	1	¾	⅝	
Worthington.....	.....	.....	.....	1	.....	1	2
Crown	1	4	6	.....	1	.....	12
Hersey.....	.....	.....	1	.....	.....	.....	1
Lambert .....	.....	1	.....	.....	.....	.....	1
Gem	2	.....	.....	.....	.....	.....	2
Totals.....	3	5	7	1	1	1	18

Table XVI.
Meters Discontinued.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....	...	5	6	31	14	81	52	.....	189
Crown	1	9	12	14	14	43	54	124	262
Metropolitan.....	.....	.....	.....	.....	2	22	66	.....	90
Hersey.....	.....	.....	4	6	8	9	13	1	41
B. W. W.....	.....	.....	.....	.....	.....	.....	5	.....	5
Gem .....	.....	3	.....	.....	.....	.....	.....	.....	3
Ball & Fitts.....	.....	.....	1	1	.....	.....	.....	.....	2
Lambert .....	.....	.....	.....	.....	.....	.....	.....	1	1
Totals.....	1	17	23	52	38	146	190	126	593

Table XVII.
Meters Purchased.

	DIAMETER IN INCHES.							Totals.
	4	3	2	1½	1	¾	⅝	
Hersey	1	1						2
Lambert.....			2	3	2	4	2	13
Nash.....					2	2		4
Empire					2			2
Trident.....					2			2
Disc					2			2
Totals.....	1	1	2	3	10	6	2	25

Table XVIII.
Meters Sold.

	DIAMETER IN INCHES.					Totals.
	2	1½	1	¾	⅝	
Thompson	2	3	2	4	2	13
Crown	1	.....	.....	.....	2	3
Worthington.....	.....	.....	1	.....	.....	1
Totals.....	3	3	3	4	4	17

Table XIX.
Meters Repaired at Factory.

	DIAMETER IN INCHES.							Totals.
	4	3	2	1½	1	¾	½	
Worthington		1	8	3	25	1	.....	38
Crown	3	1	5	4	12	22	97	144
Hersey		2	.....	5	5	7	.....	19
Metropolitan .....		.....	.....	3	43	213	1	260
Ball & Fitts		1	.....	.....	.....	.....	.....	1
Totals.....	3	5	13	15	85	243	98	462

Table XX.
Meters Repaired in Service.

CAUSE OF REPAIRS.	Totals.
Cap broken	734
Glass broken	266
Leak at spindle	177
“ “ stop-cock	7
“ “ coupling	48
“ “ body	3
“ on pipe	5
Bolts loose	3
Spindle stuck	3
“ broken	12
Hands stuck	7
Retapped for cap screws	2
Clock defaced	34
Cover loose	2
Pawl stuck	2
Not registering	6
Hands loose	3
Gears loose	5
Hands broken	76
Counter-box loose	1
Clock condemned	14
“ pin broken	4
“ loose	4
Hands untrue	2
Piston stuck	2
Ratchet out of order	5
<i>Carried forward.....</i>	1,427

Table XX. — Concluded.

CAUSE OF REPAIRS.	Totals.
<i>Brought forward</i>	1,427
Meter insecure.....	5
Set backwards.....	2
Clock train broken.....	2
Lever stuck.....	2
Fish in meter.....	3
Intermittent.....	1
Total	1,442

Table XXI.*Meters Changed.*

CAUSE.	Totals.	CAUSE.	Totals.
For test.....	397	<i>Brought forward</i>	925
Not registering (cause unknown).....	70	Hands broken.....	52
No force (cause unknown).....	39	Piston rod short.....	3
Leak at body.....	19	Piston rod bent.....	1
Leak at spindle.....	22	Hands stuck.....	12
Spindle broken.....	34	Clock broken.....	21
Ratchet broken.....	7	Cap broken.....	85
Glass broken.....	22	Location changed.....	11
Rust.....	63	Pawl detached.....	2
Enlargement.....	36	Gravel.....	10
Gears loose.....	10	Fish.....	8
Frost.....	21	Cylinder dented.....	1
Heat.....	20	Plate broken.....	4
Stoppage (cause unknown).....	21	Clock defaced.....	10
Gears did not mesh.....	17	Screws loose.....	3
Intermediate train worn.....	53	Leak at connections.....	4
Intermediate train broken.....	34	Pawl stuck.....	4
Piston stuck.....	16	Valves worn.....	1
Clock train broken.....	3	Gear lost.....	1
Lever broken.....	6	Set backwards.....	4
Piston broken.....	2	Clock detached.....	2
Intermediate shaft broken.....	3	Cylinder points broken.....	1
Gasket.....	1	Service reduced.....	2
Solder.....	4	Intermediate train stuck.....	5
Rods broken.....	2	Pawl worn.....	1
Lever detached.....	3	Applied counter extension.....	3
<i>Carried forward</i>	925	Total	1,176

Table XXII.*Meters in Service January 31, 1899.*

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....	2	20	30	136	124	585	404	4	1,305
Crown.....	7	44	52	81	157	370	461	1,247	2,419
Hersey....		5	11	19	39	78	176	16	344
Metropolitan.....				4	15	102	484	1	606
Thomson.....							1	8	9
B. W. W.....							36		36
Gem.....	1	3							4
Champion.....							1		1
Torrent.....	1								1
Lambert.....				2	3	2	3	4	14
Empire.....						1	2		3
Nash.....						2	2	2	6
Disc.....						2			2
Trident.....						2			2
Totals.....	11	72	93	242	338	1,144	1,570	1,282	4,752

Table XXIII.*Private Meters in Department Service, January, 31, 1899.*

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....			1	4	2	6	1	5	19
Crown.....	1	3	2	4	12	5	2	12	41
Hersey.....			1	1	3				5
Thomson.....					1				1
B. W. W.....							1		1
Ball & Fltts.....				1					1
Gem.....	2								2
Lambert.....				1					1
Totals.....	3	3	4	11	18	11	4	17	71

Table XXIV.*Meters at Factory for Repairs, January 31, 1899.*

	DIAMETER IN INCHES.						Totals.
	3	2	1½	1	¾	⅝	
Crown		1	1	.....	4	14	20
Worthington	1	.....	.....	7	2	.....	10
Hersey .....	.....	.....	.....	1	.....	.....	1
Totals	1	1	1	8	6	14	31

Table XXV.*Meters at Department Shop, January 31, 1899.*

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....		4	3	25	4	37	54	2	129
Crown		2	3	5	5	8	12	78	113
Hersey		1	2	4	3	1	8	2	21
Metropolitan.....		.....	.....	.....	5	30	154	2	191
B. W. W.....		.....	.....	.....	.....	.....	4	.....	4
Thomson.....		.....	.....	.....	.....	.....	1	1	2
Ball & Fitts.....		.....	1	1	.....	.....	4	2	8
Gem.....	1	1	4	2	.....	.....	.....	.....	8
Empire.....	.....	.....	.....	.....	.....	1	.....	.....	1
Undine.....	.....	.....	.....	.....	.....	.....	1	4	5
Desper .....	.....	.....	.....	.....	.....	.....	.....	2	2
Tremont .....	.....	.....	.....	.....	.....	1	.....	1	2
Spooner .....	.....	.....	.....	.....	.....	.....	.....	1	1
Balance valve.....	.....	.....	.....	.....	.....	.....	.....	1	1
Equitable .....	.....	.....	.....	.....	.....	.....	1	.....	1
Beck & Co.....	.....	.....	.....	.....	.....	.....	.....	1	1
Duplex.....	.....	.....	.....	.....	.....	1	.....	.....	1
Niagara .....	.....	.....	.....	.....	.....	.....	.....	1	1
(Star on end) no name .....	.....	.....	.....	.....	.....	.....	.....	1	1
Proportional.....	.....	.....	.....	.....	.....	.....	1	.....	1
Smith .....	.....	.....	.....	.....	.....	1	.....	.....	1
Totals	1	8	13	37	17	80	240	99	495

DEACON SERVICE.

The Deacon Meter Service was transferred from the Distribution Division to the Income Division on December 9, 1898; the following report, however, covers the work of the entire year, ending January 31, 1899.

The Deacon meters were placed in operation for the year on March 30, 1898, and their work ceased November 28, 1898. During this period 63 meters were operated, from which 717 diagrams were obtained, being 349 readings of 24 hours each and 368 night tests, giving the results of readings and tests of 152 sections. These diagrams were delivered to the City Engineer for compilation.

The Deacon meters in Charlestown could not be operated, on account of the high service having so many dead ends that it was impossible to work a section without interfering with the water supply of surrounding streets.

A second operation of the meters in South Boston could not be made, owing to the delay in the changing of pipes and connections from the Cochituate to the Metropolitan supply.

The construction of Columbia road prevented the use of the Columbia street and Boston street meters early in the year, hence second readings in Dorchester meters could not be obtained.

The work of the inspection corps in detecting waste was confined to sections of the city where the meters had indicated excessive waste of water, excepting during the months of December, 1898, and January, 1899, when the men were working in sections of the city where the meters could not be operated.

The following tables cover the work of the Deacon service for the year:

Table XXVI.

Waste Inspection.

	NUMBER.
Houses inspected	54,007
Waste reports made	11,051
Re-examinations	13,779

Table XXVII.*Waste Re-examination Previous to Repairs.*

	NUMBER.
Not repaired from 1897 inspection.....	687
Re-examined once and repaired.....	8,588
“ twice “ “	1,299
“ three times and repaired.....	310
“ four “ “ “	125
“ five “ “ “	63
“ six “ “ “	21
“ seven “ “ “	5

Table XXVIII.*Defective Fixtures and Waste.*

	NUMBER.
Tank fixtures leaking.....	7,110
Faucets leaking.....	4,655
Closets “	1,080
Pipes burst.....	413
Wilful waste cases.....	164

APPENDIX C.

REPORT OF THE DISTRIBUTION DIVISION.

OFFICE OF THE GENERAL SUPERINTENDENT,
710 ALBANY STREET, February 1, 1899.

HON. JOHN R. MURPHY,

Water Commissioner :

I herewith submit the annual report of the Distribution Division for the year ending January 31, 1899.

MAIN PIPE.

There were laid during the year 33.6 miles of main pipe. This amount includes 3,220 feet of private mains laid for various parties, 3,273 feet of hydrant, blow-off, and reservoir pipe, 44 feet of Deacon meter pipe, and 1,806 feet of main pipe lowered, raised, and moved laterally, which do not affect the length of the distribution system.

Nine and one-tenth miles of pipe were abandoned, making the total length of our distribution system 689.2 miles.

Of the 33.6 miles laid, 8 miles were relaid.

The 30-inch high service main for the Dorchester District was continued from the point in Geneva avenue, near Blue Hill avenue, where we stopped last year, through Geneva avenue, Bowdoin and Washington streets, to a point in Washington street, near Bowdoin street, and there capped. During the coming year it will be extended further in a southerly direction, thus giving a much better service throughout the Dorchester District. The small portion of this line at the junction of Columbus avenue and Centre street, referred to in last year's report as not being laid, was laid during the early part of the past year, and gave the Elm Hill District a direct supply that allowed the abandonment of the Wayne-street Pumping Station.

In Columbia road, from Blue Hill avenue to Edward Everett square, 24-inch, 20-inch, 16-inch, 12-inch and 6-inch lines have been laid, which will give, when connected, to this

boulevard and the territory adjacent to and connected by, a most sufficient supply.

The West Roxbury high service was extended by a 24-inch line from the Forest Hills Station, through South street, to the Arnold Arboretum, and there connected to a piece previously laid. The line was then carried through Walter and South streets to Roberts street and there temporarily ended. Connections were made at the junction of Walter and Weld streets and at the junction of South and Roberts streets, thereby permitting the substitution of the Fisher Hill high service for the tank service on Skinner Hill. At the present writing we are engaged in extending this 24-inch line to give to the district an ample supply.

A 16-inch main was taken off the above mentioned 24-inch main and laid in Roberts street as far as Corinth street and there temporarily capped. This is to supplement the supply of the eastern portion of West Roxbury.

A 16-inch line was laid from Ashmont street at Train street, through Ashmont street to Neponset avenue, and there reduced to 12 inches and continued through Neponset avenue, across the bridge, through Hancock street, Quincy, to Atlantic street, through Atlantic and Squantum streets to Beach road, through Beach road to Moon Island road, and through Moon Island road to the sea-wall on Moon Island, opposite Long Island, where at some later date it will be continued under water to Long Island. This line will give to the various islands in the harbor a much needed supply for fire protection and domestic use.

A 12-inch main was laid in Mt. Vernon street, West Roxbury, from Temple to Baker streets, giving an additional feed to that extreme portion of West Roxbury and reinforcing the service in that section that was previously wholly dependent upon Centre street for its supply.

A 20-inch line has been laid in Third street, between Dorchester street and Q street. This is a great step towards the completion of a connecting loop in the low service supplies of South Boston and Dorchester.

The 8-inch low service main in Summer-street extension was relaid with 12-inch and extended from its former end at Gilbert place to Dorchester avenue, and in that street for a distance of about 1,500 feet towards the bridge. The 8-inch high service main in Summer-street extension was relaid with 12-inch and extended from its former end at Gilbert place with 10-inch pipe to Dorchester avenue, and in that street for a distance of about 1,400 feet towards the bridge. A 12-inch private line was laid across the yard of the new

terminal and connects the above mentioned 12-inch low service in Dorchester avenue with the 16-inch low service in Atlantic avenue.

About 680 feet of 12-inch salt water main was laid in Central Wharf, from Atlantic avenue to the water front.

Prominent in the relaying work performed during the year was that in Shawmut avenue, where the 6-inch main was relaid with 12-inch from Newton street to Massachusetts avenue, and with 16-inch from Massachusetts avenue to Vernon street; in Guild street, Roxbury, where the 4-inch main was replaced by a 12-inch; and in Heath street, Parker street, Bromley Park, Wensley street and Bickford avenue, where the old mains have been relaid with larger ones. All this work considerably increases the efficiency of the fire service in the vicinity of these streets.

A great deal of complicated work was carried on in the West Roxbury District, where, on account of the abolition of grade crossings along the line of the N.Y., N.H. & H. R.R., our system had to be adjusted to the new conditions.

In Sterling, Weston, and Newbern streets, Roxbury, about 900 feet of old Jamaica pond aqueduct pipe was abandoned and replaced with larger sized modern pipe. We hope in the near future to remove the remainder of this objectionable system.

Where desirable and practicable, dead ends were abolished by connecting, thus giving better circulation and preventing pollution of the water at those points.

Unusual precautions have been taken against freezing in mains laid in exposed places, principally on bridges.

In Francis street, Brookline avenue, and Washington street, near Arnold street, we found blow-offs that were not connected with the sewer, but opened into private property, thus exposing the same to damage. This dangerous and useless arrangement constructed in former years has been remedied in these instances, and we are now investigating similar defects at other points.

During the year 2,503 feet of abandoned 12-inch pipe were taken from the ground and being in good condition have been utilized again in place of new pipe. This resulted in a saving to the department.

GATES OR STOP-COCKS.

Six hundred and sixteen gates were established and 173 abandoned; of the former 16 were "blow-off" and 23 were private gates, and of the latter 4 were "blow-off" gates.

This makes the total number of gates in use, exclusive of "blow-off" and private gates, 8,339. The gates have been thoroughly looked after, as will be seen by reference to our statement of miscellaneous work performed, wherein it is stated that 16,250 gate inspections have been made, 8,791 locations of gates marked and remarked, 219 gates oiled and cleaned in service, 7,220 salt deposits made on gate covers to prevent freezing, 824 boxes repaired in service, and 291 boxes renewed in service. During the coming year the covers to all gates will be so marked as to show at a glance whether or not the gate is a division gate, or if it controls a main, service, fire, motor, or elevator pipe. In some sections of the city there is a complex arrangement of pipes and gates, and in order to facilitate a correct operation of the same they are to be numbered on the box covers correspondingly to numbers of the same gates represented on plans in our office. Thus by consulting the plans one can get the numbers of the gates to be operated in order to achieve certain desired results and when upon the ground he can by simply referring to the numbers on the covers locate these gates and carry out his purpose with no delay and considerable certainty. We have already numbered in this way the gates at Roxbury Crossing.

AIR-COCKS.

During the year 17 air-cocks were established and two abandoned in various parts of the city.

BLOW-OFF COCKS.

Ten of various sizes were established and one abandoned.

DEACON METERS.

One was established at Long Island; one was abandoned at Castle street, corner of Tremont street, and one was abandoned at Columbia road, corner of Sayward street.

HYDRANTS.

Five hundred and thirty-three hydrants were established and 388 abandoned. Of the number established, 12 were salt-water hydrants and have no connection with our system. The total number of hydrants connected with our system up to date is 7,368. During the year we abandoned 150 Boston hydrants, and in almost every case replaced them with either Lowry's or Post's. This is a distinct gain to the fire service of the city, as the Boston hydrant is of insufficient

capacity, and very rarely used by the Fire Department. The usual attention was given the hydrants during the year. A glance at our schedule of miscellaneous work performed will show that 150,000 hydrant inspections were made during cold weather and 7,014 repairs of a miscellaneous character made on the hydrants. Three thousand one hundred and thirty-three bags of salt were purchased by this department and delivered to the Fire Department, to be used on hydrant covers during the cold weather.

WATER POSTS.

During the year sixty water posts were established and thirteen abandoned, making a total now in use of 455. This surpasses all previous records of the number established and abandoned in one year. The customary attention was given to their proper maintenance.

FOUNTAINS.

Nineteen drinking fountains were established and eight abandoned. The total number in use is 96. A table giving the number, style, and location of each is attached. Of the number established 10 were cold water fountains. We also fitted two ordinary fountains with cold water attachments.

In connection with the cold water fountains we cut and stored, for use during the coming summer, about 1,700 tons of ice in Brookline and East Boston Reservoirs.

SERVICE PIPES.

Two thousand three hundred and sixty-six service pipes (52,866 feet) have been laid during the year, and 263 (7,006 feet) abandoned, showing a net increase of 2,103 service pipes (45,859 feet) for the year, and making the total number of pipes now in use 84,129, with a length of 2,343,425 feet.

Under the law governing the laying out of new streets, we were obliged to lay to vacant lots 589 service pipes, from which no revenue is at present derived.

It has frequently happened that in laying mains in private ways or in streets that were formerly private ways, we have met with service pipes laid irregularly, *i.e.*, from a point not directly opposite the premises they supply, and when it was practicable to do so we relaid them in a regular manner free of charge. We shall continue to do this in all similar cases.

SHOPS.

The following statement will show the amount of work performed by the different shops during the year :

Machine Shop—Manufactures.

Gates of various sizes (mostly large sizes)	467
Cocks of various sizes	4,693
Nipples of various sizes	1,001
Coupling nuts, various sizes	8,984
Coupling tubes, various sizes	9,506
Male couplings, various sizes	1,568
Plugs, various sizes	485
Air-cocks, various sizes	12
Hydrants, various styles	374
Hydrant wastes, large	452
Hydrant wastes, small	30
Set screws	1,792
Hydrant bolts	2,761
Sidewalk tops	1,504
Jointers, various sizes	46
Puddling heads	19
Thimbles, various sizes	67
Lowry hydrant chucks	2
Lamp-post nuts	33

Repairs were made on the following :

Hydrants, various styles	179
Gates, various sizes	72
Hydrant wastes	145
Cocks, various sizes	107
Couplings, various sizes	488

Carpenter Shop—Manufactures.

Hydrant, gate, and meter boxes	1,519
--------------------------------	-------

Blacksmith Shop.

Picks pointed	10,524
Picks re-steelled	323

An idea may be had of the widely diversified nature of the work performed by our mechanics and artisans by examining the following statement. The work compares with similar work performed by outsiders making a specialty of the same. A most important feature of the year was the establishment of a wheelwright plant. We now perform all repairs to our rolling-stock and even manufacture wagons when required.

Ice-house built at East Boston, dimensions forty by eighty.

Ice-house built at Brookline, dimensions forty by sixty-five.

1,700 tons of ice cut and stored.

1,150 feet of Fisher avenue roadway macadamized.

Street built through Fisher Hill Reservoir grounds — about 800 feet long.

Stone wall, sixty-nine feet long and three feet nine inches high, built at Brookline Reservoir.

Stone wall, 600 feet long, rebuilt at Brookline Reservoir.

Manufactured the following office furniture :

One cabinet.

Two desks.

One card holder.

One large oak cashier's desk.

One combination counter and cabinet.

One file case.

Erected stable at Brookline Reservoir, dimensions thirty by fifteen.

Erected house at Brookline Reservoir for storage purposes.

Graded driveway and cleaned grounds at Brookline and Fisher Hill.

Repaired and painted fence at Parker Hill Reservoir.

Built new fence, 1,468 feet long, at Brookline Reservoir.

Repaired old fence, for a distance of 1,071 feet, at Brookline Reservoir.

Made hay at Brookline and Fisher Hill Reservoirs (twenty tons).

Built bulkhead at Long Island.

Maintained buildings in outside yards in good order.

Fertilized grounds at the Brookline and Fisher Hill Reservoirs.

Straightened and painted fence around East Boston Reservoir.

Made sewer connections at Charlestown stable.

Fitted up four thawing boilers and made apparatus to be used in connection with the same.

Made two derricks.

“ twenty-four plumbers' furnaces.

“ sixty-two wrenches.

“ three iron crowbars.

“ seven jacks.

“ six patterns.

“ large tool-house.

“ fifteen copper shafting pans.

“ 539 tools of various kinds.

“ one pantograph.

“ thirty-four sets of calking tools.

“ five step ladders.

“ one flag-pole.

“ one express wagon.

“ ventilators for office.

“ one pipe truck.

“ one ice-wagon.

Made four small buildings in yard for charcoal, sand and junk.

- “ and fitted up twenty-six lead pots.
- “ brick furnace for use of wheelwright.
- “ forty-four repairs on office furniture.
- “ eleven repairs on steam pipes and fixtures.
- “ thirty-one repairs to pumps.
- “ ninety-seven repairs on wrenches.
- “ twenty repairs on tool-houses.
- “ sixteen repairs on patterns.
- “ nine repairs on derricks.
- “ 228 repairs on tools.
- “ 135 repairs on wagons.
- “ one repair on gas fixtures.
- “ ninety-three repairs on stable.
- “ ninety-two repairs on carriages.
- “ sixty-nine repairs on buildings.
- “ two repairs on engine.
- “ two repairs on large platform scale.

Repaired and painted gate at entrance to yard.

Remodelled hot water apparatus in stable.

Extended steam heating apparatus three times.

Put in two new hoppers in toilet-room.

Extended gas fixtures five times.

Made fifteen repairs on sleighs.

Lettered the stock boxes in storeroom.

Painted buildings outside and inside.

Inspected shafting by order of State Inspector.

Replaced ninety-one panes of window glass.

MAINTENANCE.

We have made 3,432 repairs on pipes of all sizes during the year, for causes of which see table appended. We have had more stoppages by fish this year than for several years previous. They have been especially prevalent in the Charlestown and East Boston Districts. Steps should be taken to eliminate these animals from our supply, as they are a source of inconvenience to consumers and are certainly not agreeable things to associate with our drinking water.

The statement of miscellaneous work performed represents a vast amount of work of a miscellaneous character necessary to the maintenance of our system.

Attention has been given this year, as usual, to the operations in the public streets of corporations, etc., to protect our interests if necessary. Alterations of advantage to us were made by said corporations, contractors, etc., in their original plans, which would not have been made but for vigilance upon our part.

HARBOR SERVICE.

The mains in the harbor and on various islands located therein have been looked after with that care that is most necessary with this branch of our service. We have repeatedly replaced bulkheads and earth material washed away from our pipes by the heavy seas. A sea-wall is now being built at Moon Island and when completed it is expected to serve as a protection against heavy weather, and to render the continual replacing of the covering of our pipes laid in the shore of the island, unnecessary. On Long Island a four-inch private main 731 feet long was laid for the Pauper Institutions from the reservoir to the piggery and ice pond. Services were also laid to the various institutions and to the fortification on the island.

RESERVOIRS AND STAND-PIPES.

East Boston.—This reservoir is in good condition. A most substantial building for the storage of ice was erected here the past winter by the department. It has a capacity of about 875 tons.

Parker Hill.—This property is in first-class condition.

Fisher Hill.—The buildings here have been thoroughly overhauled and repaired, and the grounds graded, fertilized and put in good condition. A road about 800 feet long has been built by this department through the grounds, thus giving vehicles an opportunity to approach the reservoir and the buildings located about it, without driving over the lawn as was heretofore the case.

Brookline Reservoir.—A new wooden fence 1,468 feet long was built on the Walnut street side of the reservoir. The fence on the Boylston street side was repaired for a distance of 1,071 feet. The stone wall on this side was repaired for a distance of about 600 feet and on Warren street a wall 69 feet long and 3 feet 9 inches high was erected. Upon the grounds a stable, an ice-house, and several small buildings for storage purposes were erected. Two wooden bridges were built across the brook. The gate-house was painted inside. The ground was fertilized and two crops of hay raised and harvested. A considerable quantity of property which the Metropolitan Water Board refused to take with other things transferred to their keeping upon January 1, 1898, had to be removed from Chestnut Hill Reservoir to Brookline and Fisher Hill Reservoirs for storage until we can dispose of it to advantage.

Mt. Bellevue Stand-pipe. — This building is in good condition. During the year 5,180 people visited it for observation purposes, it being located on the highest land in the city of Boston.

FIRE RESERVOIRS.

During the year the reservoir at the corner of Pearl and Franklin streets was abandoned on account of the operations of this department. The reservoirs connected with our system were maintained in the usual manner.

PUMPING STATIONS.

West Roxbury. — During the year this station was kept in good order, repairs of minor importance being made from time to time. The steam supply pipe to the pumps was enlarged, thereby increasing the efficiency of the same. This station was to-day transferred by lease to the Metropolitan Water Board, who take it as part of their supply system.

Wayne street. — This station was rendered unnecessary by the completion of the 36-inch high service line through the Elm Hill District and was accordingly abandoned.

East Boston. — This station was rendered unnecessary by the increased supply given East Boston during the year. It has been put out of use, but is still held by the department until a permanently satisfactory supply is assured.

YARDS.

Albany street. — As this yard was in good condition at the beginning of the year nothing of importance has been done since. There still exists the necessity for more room. The steam heating system formerly confined to the offices is now being extended throughout the shops. The various outbuildings situated in the yard have been painted and one was remodelled into a wheelwright shop and a wheelwright's furnace constructed adjacent thereto. A hospital stall was built in the stable and a larger hot water boiler substituted for the old one.

Charlestown, West Roxbury, Brighton, Dorchester and East Boston. — With the exception of certain sanitary improvements made in the Charlestown yard nothing of importance was done in these yards, as they were in good condition at the beginning of the year.

ELECTROLYSIS.

Electrical tests upon the water pipe system throughout the city have been continued this year. Tests have been made upon hydrants and upon service pipes. During the fine weather the hydrants have been tested to determine the electrical potential difference between them and the surrounding earth, and also to ascertain the direction of the tendency of electrical flow. Plans are being prepared showing the results of the tests made at each hydrant. These plans will show the changes in the electrical conditions from time to time, will enable us to determine the points of danger, and will assist in the study of the elimination of the trouble.

IMPROVEMENTS IN KEEPING RECORDS AND ACCOUNTS.

As an indication of the thorough manner in which the records and accounts of the department are now kept, as compared with previous years, I need only state that in 1898 61,834 reports of various kinds were made, as against 18,105 in 1895.

Appended you will find tables showing details of the work performed.

Yours respectfully,

HUGH McNULTY,

General Superintendent Distribution Division.

Table Showing Length of Distribution Mains laid or relaid, and abandoned during the Year 1898, and the total length of the Distribution System of the City of Boston, January 31, 1899.

	DIAMETER OF PIPES IN INCHES.															Totals.	
	48	42	40	36	30	28	24	20	16	12	10	8	6	4	3		2
Total connected with system January 31, 1898.....	33,671	16,813	23,104	37,677	77,497	244	72,283	82,715	129,110	961,267	72,092	400,556	1,409,357	129,749	7,906	3,715	3,517,786
Length laid or relaid during the year.....	.....	.....	.....	2,307	4,436	.....	9,327	6,207	12,538	63,244	5,124	19,486	46,626	59	.....	.....	169,354
Length abandoned during the year.....	.....	.....	.....	.....	312	.....	.....	888	591	12,705	383	3,010	22,971	6,630	230	250	47,970
Total connected with system January 31, 1899.....	33,671	16,813	23,104	39,984	81,621	244	81,610	88,034	141,057	1,011,806	76,833	477,032	1,433,012	129,178	7,076	3,495	3,639,170 or 689.2 m.

Statement of Hydrant, Blow-off, and Reservoir Pipes, January 31, 1899.

	DIAMETER IN INCHES.								Totals.
	16	12	10	9	8	6	4	3	
Total length in use January 31, 1898.....	472	7,148	100	2,849	1,062	26,682	10,560	3	48,876
Length laid or relaid during the year.....	.....	27	5	.....	66	3,032	143	.....	3,273
Length abandoned during the year.....	.....	35	.....	68	.....	328	1,096	.....	1,527
Total length in use January 31, 1899.....	472	7,140	105	2,781	1,128	29,386	9,607	3	50,622

37	1,277	6	170	6	198	7	188	6	209	5	111	3	64	4	67	1	9	75	2,293
" laid																			
9	267	1	31	1	29					1	38							12	365
" laid																			
65	1,526	96	2,633	78	2,137	409	9,011½	931	18,163½	320	6,910½	135	3,290½	20	420			2,054	44,155½
" abandoned.....																			
92	2,496	6	156	7	367½	21	554	20	553	12	232½	2	18	6	100			166	4,477
" "																			
1	17			4	111	33	766½	2	66					6	94			46	1,054½
Total laid.....	247	6,614	122	3,470	93	2,615	438	9,957½	957	18,845½	333	7,228½	145	29	582	2	25	2,366	52,866½
Total abandoned..	130	3,595	7	187	14	539½	57	1,302½	23	640	15	355½	4	53	13			253	7,006½
Net increase.....	117	3,019	115	3,283	79	2,075½	381	8,565	934	18,205½	318	6,873	141	16	338	2	25	2,103	45,859½

Statement of Location, Size and Number of Feet of Main Pipe Relaid during the Year ending January 31, 1899.

NOTE.—C. P. indicates City Proper; Rox., Roxbury; W. R., West Roxbury; Bri., Brighton; Dor., Dorchester; So. B., South Boston; E. B., East Boston; Chsn., Charlestown.

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
Tremont st.....	At Common st.....	C. P.	30-in.	12	30-in.
“ “	“ Castle sq.....	“	“	300	“
	Total 30-inch.....			<u>312</u>	
Columbla road....	Edward Everett sq. and Dudley st..	Dor.	20-in.	884	20-in.
Huntington ave....	At Dartmouth st.....	C. P.	“	4	“
	Total 20-inch.....			<u>888</u>	
Beverly st.	Opposite Fitchburg depot.....	C. P.	16-in.	3	16-in.
Commercial st. .	State and Clinton sts.....	“	“	500	12-in.
Court st.....	Cornhill and Franklin ave.....	“	“	231	6-in.
Tremont st.....	School st. and Scollay sq.....	“	“	4	16-in.
Blue Hill ave.....	At Walk Hill st.....	Dor.	“	50	“
Neponset ave.....	Ashmont st. and Bridge.....	“	“	2,990	6-in.
Ashmont st.....	Neponset ave. and Train st.....	“	“	360	12-in.
Columbia road....	Washington st. and Geneva ave....	“	“	647	12-in.
Columbia road (con- tract).....	Pond and Dudley sts.....	“	“	450	16-in.
Congress st.....	At Railroad tracks.....	So. B.	“	11	“
Dorchester st.....	“ “ Bridge.....	“	“	30	“
New Heath st.....	Columbus ave. and Terrace st.....	Rox.	“	246	6-in.
Terrace st.....	At New Heath st.....	“	“	28	“
Shawmut ave	Massachusetts ave. and Vernon st..	Rox. and C. P.	“	3075	“
Roberts st.....	Brookfield and South Walter sts....	W. R.	“	421	“
Chelsea st... ..	At City sq....	Chsn.	“	8	“
Warren ave.....	Front st. and City sq	“	“	7	“
	Total 16-inch.....			<u>9,061</u>	
Blackstone st.....	At Clinton st.....	C. P.	12-in.	20	12-in.
Shawmut ave.....	West Newton and Rutland sts.....	“	“	36	6-in.
“ “	At Massachusetts ave.....	“	“	20	“
	<i>Carried forward.....</i>			76	

Statement of Main Pipe Relaid. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward.....</i>			76	
West Newton st....	Shawmut ave. and Tremont st.....	C. P.	12-in.	12	12-in.
Pleasant st.....	Opp. Melrose st.....	"	"	7	"
" "	" Tennyson st.....	"	"	3	"
" "	At " "	"	"	5	"
" "	Opp. Piedmont st.....	"	"	4	"
Worcester st.....	At Shawmut ave.....	"	"	12	6-in.
South Margin st...	Pitts and Staniford sts.....	"	"	543	"
Shawmut ave.....	Rutland st. and Massachusetts ave.	"	"	995	"
Columbus ave.....	Junc. Grenville pl. and Ferdinand st.	"	"	4	12-in.
Northampton st....	At Shawmut ave.....	"	"	24	"
Hull st.....	Salem and Snowhill sts.....	"	"	541	6-in.
Commercial st....	15 ft. south of No. 445-7.....	"	"	5	12-in.
Massachusetts ave.	At Dundee st.....	"	"	4	"
Huntington ave....	" Dartmouth st.....	"	"	25	"
Harrison ave.....	" Randolph st.....	"	"	3	"
" "	" Genesee st.....	"	"	3	"
Harvard st.....	Near No. 17.....	"	"	4	"
Way st.....	Harrison ave. and Albany st.....	"	"	480	"
Fleet st.....	At Moon st.....	"	"	4	"
Tremont st.....	Pleasant and Warrenton sts.....	"	"	205	8-in.
" "	At Castle sq.....	"	"	87	12-in.
North st.....	Junction Lewis st.....	"	"	5	"
Court st.....	Hanover st. and Cornhill.....	"	"	220	"
Hanover st.....	North of Court st.....	"	"	4	"
Prince st.....	At Bennett ave.....	"	"	4	"
Leverett st.....	" Causeway st.....	"	"	9	"
Snow Hill st.....	Opp. Sheafe st.....	"	"	3	6-in.
Albion st.....	Castle and Paul sts.....	"	"	82	"
Paul st.....	Albion and Tremont sts.....	"	"	165	"
Castle st.....	West line of Middlesex st.....	"	"	5	12-in.
Berkeley st.....	Chandler st. and bridge.....	"	"	263	"
Canal st.....	Near Travers st.....	"	"	9	"
Kneeland st.....	Across Atlantic ave.....	"	"	76	6-in.
Dartmouth st.....	Columbus ave. and bridge.....	"	"	185	"
	<i>Carried forward.....</i>			4,076	

Statement of Main Pipe Relaid. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			4,076	
Way st.....	Harrison ave. and Albany st.....	C. P.	12-in.	20	12-in.
Berkeley st.....	Chandler st. and bridge.....	"	"	34	"
Summer st.....	Atlantic and Dorchester aves.....	"	"	840	8-in.
" "	" " and Gilbert pl.....	"	"	567	"
Atlantic ave.....	At Summer st.....	"	"	4	12-in.
Washington st....	Opp. Jordan, Marsh & Co.....	"	"	3	"
Bowdoin st.....	Holiday and Topliff sts.....	Dor.	"	466	"
Bernard st	At Helen st.....	"	"	14	"
Clayton st.....	" Freeport st.....	"	"	28	6-in.
Columbia road....	Wales pl. and railroad.....	"	"	348	12-in.
" "	Geneva ave. and "	"	"	545	"
" "	Railroad and Quincy st.....	"	"	766	"
" "	Quincy and Glendale sts.....	"	"	733	"
" "	Edward Everett sq. and Dudley st..	"	"	1,585	"
Draper st.....	Robinson and Westville sts.....	"	"	145	6-in.
Dudley st.....	At Columbia road	"	"	47	12-in.
East Cottage st...	West of Columbia road.....	"	"	5	"
Erle st.....	At Hewins st.	"	"	15	"
" "	" New Seaver st.	"	"	12	"
Geneva ave.....	Blue Hill ave. and Wilder st.	"	"	506	6-in.
" "	At Columbia road.....	"	"	60	12-in.
Glendale st.....	East of Columbia road.....	"	"	112	6-in.
" "	At " "	"	"	37	8-in.
Glenway st.....	" York st.	"	"	12	12-in.
Morton st.....	Opposite Fuller st.	"	"	12	"
Neponset ave.....	Minot and Walnut sts.....	"	"	277	"
" "	At Mill st.....	"	"	12	"
" "	" Neponset bridge.....	"	"	120	6-in.
Norfolk st.....	" Morton st.....	"	"	5	12-in.
Park st.	Dorchester ave. and Geneva ave	"	"	12	"
Quincy st... ..	Columbia road and Stanley st.....	"	"	60	8-in.
" "	At Columbia road.	"	"	147	"
River st.	Opposite Morton st.....	"	"	15	12-in.
Spencer st.....	Wheatland and Talbot aves.....	"	"	418	6-in.
	<i>Carried forward</i>			12,058	

Statement of Main Pipe Relaid. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			12,058	
Washington st.	At Columbia road	Dor.	12-in.	40	12-in.
Westville st.	Bowdoin st. and Bowdoin sq.....	"	"	339	6-in.
Greenwich st.....	Dorchester ave. and Duncan st....	"	"	212	"
Parker st.....	New Heath and Centre sts.....	Rox.	"	1,332	"
New Heath st.....	Terrace and Parker sts.....	"	"	364	"
Wensley st.	Heath st. and Bickford ave.....	"	"	220	"
" "	At Bickford ave.	"	"	43	8-in.
Columbus ave.....	" New Heath st.....	"	"	7	12-in.
" "	Opposite Old Heath st.....	"	"	23	"
" "	New Heath and Old Heath sts.....	"	"	34	"
Ritchie st.....	At Columbus ave.	"	"	14	"
Francis st.	Brookline ave. and Binney st.....	"	"	328	6-in.
Guild st.	Washington st. and Lambert ave. ..	"	"	767	4-in.
Walnut ave.....	Buena Vista and Rockland sts.....	"	"	9	12-in.
Shawmut ave.....	At Vernon st.....	"	"	33	6-in.
Ruggles st.....	" Shawmut ave.....	"	"	20	12-in.
Vernon st.	" " "	"	"	10	"
LaGrange st.	Centre st. and N.Y., N.H. & H. R.R..	W. R.	"	121	12 & 10
" "	" " " Pleasant st.....	"	"	913	"
Keyes st.....	Washington st. and N.Y., N.H. & H. R.R.	"	"	479	12-in.
Washington st.	At Keyes st.	"	"	25	"
Spring st.	Centre and Gardner sts.....	"	"	965	"
Jordan st.....	La Grange and Dent sts.....	"	"	257	8-in.
South st.....	Brandon and Conway sts.	"	"	220	12-in.
Florence st.....	Ashland and Sycamore sts.	"	"	18	"
Park st.	At Centre st.....	"	"	16	"
Market st.	" North Beacon st.....	Bri.	"	10	"
North Beacon st...	" Market st.	"	"	13	"
" " ...	Parsons st. and Barker's lane.....	"	"	23	"
Brooks st.....	At Faneuil Station	"	"	3	"
Water st.....	" Gray st.	Chs'n.	"	48	8-in.
Warren ave.....	Front st. and City sq.....	"	"	240	6-in.
Charles River ave..	Water st. and City sq.....	"	"	11	12-in.
	<i>Carried forward</i>			19,224	

Statement of Main Pipe Relaid.—Continued.

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			19,224	
Water st.....	Warren ave. and Charles River ave.,	Chs'n.	12-in.	248	8-in.
“ “	At Wapping st.....	“	“	34	“
Byron st.....	“ Saratoga st.	E. B.	“	5	10-in.
Gove st.....	Chelsea and Bremen sts.....	“	“	206	6-in.
Haynes st.....	Orleans and Marginal sts.....	“	“	8	12-in.
Chelsea st.....	Opposite Wesley st.	“	“	6	“
London st.	At Porter st.....	“	“	6	“
Chelsea st.....	North of Marion st.....	“	“	4	“
“ “	At Curtis st.	“	“	585	6-in.
Saratoga st.....	“ Swift st.	“	“	3	“
Bremen st.....	“ Gove st.	“	“	6	“
Webster st.....	“ Cottage st.....	“	“	8	12-in.
Saratoga st.....	“ Trumbull st.....	“	“	6	“
Byron st.....	Saratoga and Bennington sts.	“	“	40	6-in.
Sumner st.	At Jeffries st.....	“	“	138	“
	Total 12-inch.....			<u>20,527</u>	
Minot st.	Opposite Wall st.	C. P.	10-in.	12	10-in.
Norman st.....	Green and Merrimac sts.....	“	“	600	6-in.
Medway st.	Over railroad bridge	Dor.	“	26	10-in.
Sterling st.....	Cabot and Tremont sts.	Rox.	“	230	3-in.
La Grange st.....	Centre and Jordan sts.....	W. Rox.	“	280	12-in.
“ “	Centre st. and N.Y., N. H. & H. R.R.,	“	“	40	10-in.
Gove st.....	Chelsea and Bremen sts.	E. B.	“	14	“
Chelsea st.	North of Marion st.....	“	“	15	“
Webster st.....	At Cottage st.	“	“	2	“
	Total 10-inch.....			<u>1,219</u>	
Brookline ave.....	Over Railroad bridge.....	C. P.	8-in.	15	8-in.
Brattle st.....	At Court st.....	“	“	37	“
Franklin ave.....	“ “ “	“	“	4	4-in.
Avon st.....	Washington and Chauncy sts.	“	“	65	6-in.
Court sq. (east)	At Court st.....	“	“	35	4-in.
Gilbert pl.....	From Summer st.....	“	“	30	6-in.
Nightingale st.....	Bicknell and Wales sts.....	Dor.	“	60	8-in.
	<i>Carried forward</i>			246	

Statement of Main Pipe Relaid.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			246	
Saxton st.....	At Romsey st.....	Dor.	8-in.	78	6-in.
Ballou ave.....	From Jones ave.....	"	"	50	8-in.
Rosseter st.	At Bullard st.....	"	"	4	"
Holden st.....	" Columbia road	"	"	26	"
Clifton st.....	From Dudley st.....	Rox.	"	380	6-in. & 4-in.
Bromley pk. (north side).....	Bickford and Albert sts.....	"	"	661	4-in.
Bryant st.....	Parker and St. Stephen sts.....	"	"	25	6-in.
Boylston ave.....	Porter and Cornwall sts.....	W. R.	"	80	8-in.
Powell st.....	Spring and Summer sts.....	"	"	152	"
Summer st.....	At Powell st.	"	"	30	"
South Walter st. ...	South Fairview and Roberts sts.....	"	"	8	"
Morton st.....	At Forest Hills st.....	"	"	10	"
Englewood ave.....	" Strathmore road.....	Brl.	"	15	"
Chiswick road	" Commonwealth ave.	"	"	18	"
Charles River ave..	Near corner of Water st.....	Chs'n.	"	68	6-in.
Water st.....	At Gray st.	"	"	8	8-in.
Mead st.....	Opposite Bunker Hill st.....	"	"	3	"
Bunker Hill st.	North of Short st.....	"	"	6	"
" " "	At Short st.	"	"	6	"
Charles River ave..	Water st. and City sq.....	"	"	4	"
Princeton st.....	At Marion st.....	E. B.	"	14	"
Chelsea st.	Near Curtis st.....	"	"	3	"
	Total 8-inch.....			1,895	
Fayette st.....	Corner Church st.	C. P.	6-in.	4	6-in.
Melrose st.....	200 feet from Pleasant st.	"	"	4	"
" "	Corner Pleasant st.....	"	"	4	"
Springfield st.....	At Shawmut ave.....	"	"	9	"
Tennyson st.....	Corner Church st.	"	"	4	"
" "	Junction of Church st.	"	"	9	"
Winchester st.....	Cor. Church st.	"	"	4	"
" "	Westerly line of Church st.....	"	"	4	"
" "	Easterly line of Church st.....	"	"	4	"
" "	Junction of Church st.	"	"	6	"
	<i>Carried forward</i>			52	

Statement of Main Pipe Relaid.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>.....	.....	.....	52	
Massachusetts ave.,	At Shawmut ave.....	C. P.	6-in.	63	4-in.
“ “	Opposite No. 621.....	“	“	4	6-in.
“ “	“ “ 690.....	“	“	4	“
“ “	210 feet west of Harrison ave.....	“	“	4	“
“ “	Opp. No. 677.....	“	“	4	“
“ “	450 feet west of Harrison ave.....	“	“	3	“
“ “	Near No. 545.....	“	“	4	“
“ “	Opp. No. 563.....	“	“	4	“
“ “	“ “ 527.....	“	“	4	“
Piedmont st.....	50 feet east from Church st.....	“	“	4	“
“ “	200 feet from Ferdinand st.....	“	“	4	“
“ “	Cor. Ferdinand st.....	“	“	4	“
Grenville pl.....	At Columbus ave.....	“	“	4	“
“ “	Columbus ave. and Church st.....	“	“	4	“
Battery st.....	Commercial st. and Ferry-house....	“	“	276	4-in.
Massachusetts ave.	Opp. No. 536.....	“	“	4	6-in.
“ “	100 feet east of No. 536.	“	“	3	“
St. James ave.....	Berkeley and Clarendon sts.....	“	“	4	“
“ “	“ “ “ “	“	“	4	“
Berkeley st.....	Opp. St. James ave.....	“	“	4	“
Massachusetts ave.	“ No. 558.....	“	“	4	“
“ “	190 feet west of Shawmut ave.....	“	“	4	“
Hanover st.....	Mechanics ct. and Board alley.....	“	“	4	“
Oxford st.....	Near No. 17.....	“	“	4	“
Edinboro st.....	“ “ 21.....	“	“	4	“
Kneeland st.....	At Whitmore st.....	“	“	9	“
Tyler st.....	Oak and Curve sts.....	“	“	245	“
Kneeland st.....	At Tyler st.....	“	“	5	“
Tyler st.....	“ Kneeland st.....	“	“	4	“
Kneeland st.....	“ Hudson st.....	“	“	6	“
“ “	Junction of Hudson st.....	“	“	4	“
Hudson st.....	Harvard and Kneeland sts.....	“	“	4	“
Hull st.....	Snowhill and Commercial sts.....	“	“	351	“
North Hudson st...	From Snowhill st.....	“	“	28	“
	<i>Carried forward</i> .....	.....	.....	1,137	

Statement of Main Pipe Relaid. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i> .....	.....	.....	1,137	
North Hudson st...	At Snowhill st	C. P.	6-in.	4	6-in.
St. James ave.....	Clarendon and Dartmouth sts.....	"	"	6	"
" "	At Clarendon st.....	"	"	4	"
Margaret st.	Cor. Sheafe st	"	"	5	"
" "	At Sheafe st.	"	"	4	"
Cortes st.....	Ferdinand and Berkeley sts.	"	"	14	"
Sheafe st.....	Snowhill and Margaret sts.	"	"	3	"
" "	Cor. Snowhill st.	"	"	4	"
Moon st.....	At Fleet st.....	"	"	3	"
Snowhill st.....	Junction North Hudson st.	"	"	20	4-in.
" "	Cor. " " " "	"	"	4	6-in.
Tileston st.	Wiggin and Hanover sts.	"	"	3	"
Fulton st.	Cor. Lewis st.	"	"	4	"
Clark st.....	Hanover and North sts.	"	"	4	"
" "	Cor. North st.....	"	"	4	"
North Bennet st...	" Hanover st.	"	"	4	"
Haverhill st.	200 feet north of Travers st.....	"	"	10	"
Ferry st.....	At Fulton st.	"	"	19	4-in.
Fulton st.	" Ferry st.	"	"	6	6-in.
" "	" " " "	"	"	4	"
North Bennet st...	At Bennet ave.....	"	"	5	"
North Centre st. ...	Hanover and North sts.	"	"	4	"
Wall st.	Minot and Causeway sts.	"	"	700	4-in.
South Market st...	At Commercial st.....	"	"	6	6-in.
" " " ...	Commercial st. and Merchants row ..	"	"	6	"
North " " ...	At Commercial st.....	"	"	6	"
Commerce st.	" " " "	"	"	6	"
Chatham st.....	" " " "	"	"	6	"
Bumstead ct.....	From Boylston st.....	"	"	130	4-in.
Blackstone st.....	At Hanover st.	"	"	4	6-in.
Sheafe st.	Snowhill and Salem sts.....	"	"	470	"
Castle st.....	Tremont and Albion sts.....	"	"	90	12-in.
Market st.....	At Merrimac st.	"	"	4	6-in.
Friend st.....	175 feet from Market st.	"	"	4	"
	<i>Carried forward</i>.....	.....	.....	2,707	

Statement of Main Pipe Relaid. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			2,707	
Friend st.	North side of Market st.	C. P.	6-in.	4	6-in.
“ “	South “ “ “ “	“	“	4	“
Court sq. (west)	At Court st.	“	“	35	4-in.
Lucas st.	Shawmut ave. and Washington st. ..	“	“	46	“
Bay st.	At Fayette st.	“	“	32	“
Jefferson st.	“ “ “	“	“	16	“
Pitts st.	At Pitts-street ct.	“	“	3	6-in.
Harwich st.	“ Dartmouth st.	“	“	12	“
Concord st.	Near Cumston st.	“	“	6	“
“ “	At James st.	“	“	3	“
Cumston st.	“ Concord st.	“	“	24	“
Estes pl.	From Summer st.	“	“	3	“
Massachusetts ave. (south side)	At Shawmut ave.	“	“	15	“
Chester pl.	“ “ “	“	“	8	“
Camden st.	“ “ “	“	“	10	“
Lenox st.	“ “ “	“	“	10	“
Sawyer st.	“ “ “	“	“	4	“
Woodbury st.	“ “ “	“	“	4	“
Kendall st.	“ “ “	“	“	4	“
Hammond st.	“ “ “	“	“	5	“
Ball st.	“ “ “	Rox.	“	2	“
Windsor st.	“ “ “	“	“	4	“
Madison st.	“ “ “	“	“	2	“
Sterling st.	“ “ “	“	“	6	“
Williams st.	“ “ “	“	“	8	“
Willow pk.	“ “ “	“	“	5	“
Winthrop pl.	“ “ “	“	“	6	“
Shawmut ave.	At Vernon st.	“	“	19	“
Notre Dame st.	Bragdon and Dimock sts.	“	“	14	“
Harold st.	Walnut ave. and Munroe st.	“	“	3	“
Wayne st.	At Blue Hill ave.	“	“	9	“
Miles st.	“ Bragdon st.	“	“	5	“
Ernst st.	“ “ “	“	“	5	“
	<i>Carried forward</i>			3,043	

Statement of Main Pipe Relaid. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			3,043	
Newbern st.....	Weston and Sterling sts.....	Rox.	6-in.	300	4-in.
Penryth st.....	At Columbus ave.....	"	"	7	6-in.
Decatur ave.....	" " "	"	"	31	"
New Heath st.....	" Parker st.....	"	"	16	"
Bromley pk. (south side).....	Bickford and Albert sts.....	"	"	657	4-in.
Bromley st.....	At Bromley pk.....	"	"	25	"
Bickford ave.....	Heath and Wensley sts.....	"	"	331	"
Bickford ave.....	At Wensley st.....	"	"	28	6-in.
Bickford Avenue pl.	" Bickford ave.....	"	"	11	4-in.
Water st.....	" Keyes st.....	W. R.	"	10	6-in.
Chapin ave.....	From La Grange st.	"	"	207	"
Pleasant st.....	At " "	"	"	8	"
Springvale ave.....	From Spring st.....	"	"	25	"
Brookfield st.	At Roberts st.....	"	"	12	"
So. Fairview st....	South and Roberts sts.....	"	"	331	"
Arborway	Across Morton st.	"	"	17	"
Selkirk road.....	At Chiswick road.....	Bri.	"	15	"
Etna st.	" Maple ave. and Garden st.....	"	"	8	"
Sidlaw road.....	" Chiswick road.....	"	"	10	"
Henshaw st.....	Market and Bentley sts.....	"	"	76	"
Albert st.....	At Adams st.	Dor.	"	5	"
Seaver st.	" Columbia road.....	"	"	7	"
Granger st.....	Near Duncan st.....	"	"	4	"
Jones ave.....	White terrace and Ballou ave.	"	"	72	"
Centre st.....	At Adams st.	"	"	72	"
Greenwich st.....	" Clayton st.....	"	"	15	"
Belfort st.....	" Saxton st.	"	"	3	"
Columbia road.....	Blue Hill ave. and Washington st...	"	"	1,056	"
Devon st.....	West of Columbia road.....	"	"	30	"
Bellevue st.	From " "	"	"	44	"
Bodwell st.....	" " "	"	"	20	"
Columbia road.....	Glendale and Davenport sts.....	"	"	770	12-in.
Bird st.....	From Columbia road.....	"	"	24	6-in.
Sayward st.....	" " "	"	"	24	"
	<i>Carried forward</i>			7,314	

Statement of Main Pipe Relaid.—*Concluded.*

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i>			7,314	
Hamlet st.....	From Columbia road	Dor.	6-in.	22	6-in.
Eastman st.....	" " "	"	"	23	"
Gold st.....	A and B sts.....	So. B.	"	320	4-in.
N st.....	At Broadway.....	"	"	4	6-in.
Sayward pl.....	" Woodward st.....	"	"	30	4-in.
Glovers ct.....	" " "	"	"	12	"
Fifth st.....	" O st.....	"	"	12	6-in.
Third st.	" " "	"	"	6	"
Sixth st.....	" M st.....	"	"	24	"
Sixth st.....	" O st.....	"	"	24	"
Seventh st.	" M st.....	"	"	12	"
B st.....	" Third st.....	"	"	12	"
Third st.	" C st.	"	"	21	"
" "	" B st.....	"	"	21	"
Second st.....	" I st.....	"	"	28	"
I st.	" Second st.	"	"	6	"
Cottage st.	" Bunker Hill st.....	Chm.	"	54	4-in.
Mead st.....	" " " "	"	"	27	"
Warren ave.	Front st. and City sq.	"	"	15	6-in.
Haynes st.....	Orleans and Marginal sts.	E. B.	"	653	4-in.
Bremen st.....	North corner of Gove st.	"	"	6	6-in.
" "	South " " " "	"	"	3	"
Princeton st.....	At Prescott st.....	"	"	12	"
Maverick sq.....	" Henry st.....	"	"	11	"
Bremen st.....	" Porter st.....	"	"	8	"
" "	" Brooks st.....	"	"	5	"
Sumner st.....	" Jeffries st.....	"	"	12	"
Webster st.....	" Cottage st.....	"	"	2	"
Princeton st.....	" Marion st.....	"	"	13	"
Chelsea st.	" Wesley st.....	"	"	5	"
Gove st.....	Chelsea and Bremen sts.....	"	"	18	"
	Total 6-inch.....			8,735	
Fulton pl.....	North and Fulton sts.	C. P.	4-in.	4	4-in.
Arnold st.....	At Shawmut ave.....	"	"	8	"
Adams pl.....	Near Williams st.....	"	"	15	"
Arnold st.....	At Shawmut ave.....	"	"	8	"
	Total 4-inch.....			35	

**Statement of Location, Size and Number of Feet of
Main Pipe Extended During the year ending January
31, 1899.**

In what Street.	Between what Streets.	District.	Size.	Length.
Geneva ave. (contract)	Columbia road and Washington st....	Dor.	36-in.	1,441
“ “	Bowdoin st. and Columbia road.....	“	“	64
Columbus ave.....	Old Heath and Dimock sts.....	Rox.	“	771
Old Heath st.....	Columbus ave. and Albert st.....	“	“	31
Total 36-inch.....				<u>2,307</u>
Geneva ave.....	Bowdoin st. and Columbia road.....	Dor.	30-in.	2,270
Washington st.....	From Bowdoin st.....	“	“	154
Bowdoin st.....	Washington st. and Geneva ave.....	“	“	1,700
Total 30-inch.....				<u>4,124</u>
Columbia road.....	Geneva ave. and R.R.....	Dor.	24-in.	1,778
“ “	R.R. and Quincy st.....	“	“	550
“ “	Quincy and Glendale sts	“	“	6
South st.....	Morton st. and Arnold Arboretum	W. R.	“	1,533
“ “	Walter and Roberts sts.....	“	“	420
“ “	Dudley ave. and Centre st.....	“	“	1,792
Walter st.....	Arnold Arboretum and South st.....	“	“	3,248
Total 24-inch.....				<u>9,827</u>
Columbia road.....	Quincy and Glendale sts.....	Dor.	20-in.	689
“ “ (contract)	Pond and Dudley sts.....	“	“	76
“ “	Glendale and Hancock sts.....	“	“	1,005
“ “	Cushing ave. and Hancock st.....	“	“	474
Edward Everett sq...	At Columbia road.....	“	“	6
Third st.....	Dorchester and N sts.....	So. B.	“	3,014
Roberts st.....	At South st.....	W. R.	“	55
Total 20-inch.....				<u>5,319</u>
Shawmut ave.....	At Massachusetts ave.....	C. P.	16-in.	16
Ashmont st.....	Neponset ave. and Train st.....	Dor.	“	677
Columbia road	Blue Hill ave. and Washington st....	“	“	1,443
Edward Everett sq...	At Columbia road.....	“	“	88
Carried forward.....				<u>2,224</u>

Statement of Main Pipe Extended.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			2,224
Columbia road	O and P sts.....	So. B.	16-in.	180
Wensley st.....	Across Heath st.....	Rox.	"	109
Roberts st.....	Brandon and South sts.....	W. R.	"	913
Corinth st.....	Across Brandon st.....	"	"	51
	Total 16-inch.....			<u>3,477</u>
Pearl st.....	Franklin and Milk sts.....	C. P.	12-in.	292
Devonshire st.....	Spring lane and Milk st.....	"	"	95
Private way.....	Off Dorchester ave.....	"	"	63
Dorchester ave.	Summer st. and bridge	"	"	1,470
Blackstone st.....	At Clinton st.....	"	"	4
Huntington ave.....	At Dartmouth st.	"	"	12
Berkeley st.	Chandler st. and R.R.....	"	"	66
Hillsdale st.	From Richfield st.	Dor.	"	329
Dorchester ave.....	Edwin and Lonsdale sts.....	"	"	382
Hamilton st.....	Speedwell and Stonehurst sts.	"	"	176
" "	" " Homes ave.....	"	"	176
Bay st.....	Auckland and Leeds sts.	"	"	137
Fairmount st.....	Milton ave. and Morton st.....	"	"	1,433
Geneva ave.....	Bowdoin and Holiday sts.....	"	"	84
Park st.	Waldeck and Greenbrier sts.....	"	"	365
Massachusetts ave....	Clapp st. and R.R.....	"	"	300
Welles ave.....	Carlisle st. and Talbot ave.....	"	"	149
Hewins st.....	Erie st. and Columbia road.....	"	"	640
Geneva ave.	From Bowdoin st.....	"	"	226
Mill st.....	Neponset ave. and Train st.....	"	"	233
Normandy st.....	At Devon st.	"	"	51
Homes ave.....	Topliff and Draper sts.....	"	"	926
Hamilton st.....	At Homes ave.....	"	"	28
Morton st.	From Blue Hill ave.	"	"	140
Hewins st.....	" Columbia road.....	"	"	26
Seaver st.....	At Columbia road.....	"	"	66
Proposed st.....	" " "	"	"	72
Hamilton st.....	" " "	"	"	30
	<i>Carried forward</i>			<u>7,976</u>

Statement of Main Pipe Extended. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			7,976
Columbia road	Glendale and Hancock sts.....	Dor.	12-in.	717
“ “	Across Columbia road at Bird st.....	“	“	71
Edward Everett sq...	At Columbia road.....	“	“	58
Bowdoin st.	At Washington st.	“	“	17
Clayton st.....	Fenton st. and Freeport st.....	“	“	309
Columbia road.....	Wales place and R.R.	“	“	30
Draper st.	Robinson and Westville sts.....	“	“	14
Norfolk st.....	At Morton st.	“	“	15
Spencer st.	Wheatland and Talbot aves.....	“	“	211
Columbia road	Geneva ave. and R.R.	“	“	690
Hamilton st.....	At Columbia road.....	“	“	30
Glendale st.....	“ “ “	“	“	77
Bird st.....	“ “ “	“	“	40
Quincy st.....	Columbia road and Stanley st.....	“	“	114
Magnolia st.....	Lawrence ave. and Quincy st.....	“	“	250
D st.....	First and Bullock sts.....	S. B.	“	784
Private way.....	A and Sleeper sts.....	“	“	500
“ “	Sleeper st. and Harbor Commissioners' Line.....	“	“	134
Sleeper st.....	Between above mentioned private ways.....	“	“	30
A st.....	At Summer-st. bridge.....	“	“	27
Summer-st. bridge....	At abutment wall.....	“	“	6
Third st.....	Dorchester and I sts.	“	“	18
Wensley st.....	Heath st. and Bickford ave.....	Rox.	“	480
Heath st.....	At Wensley st.....	“	“	11
Columbus ave.....	Centre and Dimock sts.....	“	“	829
Ritchie st.....	Across Columbus ave.....	“	“	112
Brookline ave.....	Francis st. and Kenwood road.....	“	“	201
Calumet st.	Iroquois st. and Parker Hill ave.....	“	“	868
Francis st.....	Brookline and Huntington aves.....	“	“	1,101
Terrace st.	At Tremont st.....	“	“	43
Jersey st.....	Across Peterborough st.....	“	“	70
“ “	“ Queensbury st.....	“	“	57
Lawn st.....	Heath and Ellingwood sts.....	“	“	223
	<i>Carried forward</i>			16,113

Statement of Main Pipe Extended. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			16,113
Ipswich st.....	Boylston st. and Charlesgate East	Rox.	12-in.	784
Atkinson st.	From Swett st.....	"	"	641
Roberts st.....	At South st.....	W. R.	"	18
Centre st.	At Congreve st.....	"	"	65
" "	Hastings and Park sts.	"	"	282
Maple st.....	From Weld st.....	"	"	366
Mt. Vernon st.....	Libby and Potomac sts.	"	"	436
" " "	Temple and Baker sts.....	"	"	466
Baker st.....	At Mt. Vernon st.....	"	"	9
La Grange st.....	" " " "	"	"	6
Penfield st.....	Birch and Amherst sts.....	"	"	278
Catalpa st.....	Across Perkins st.....	"	"	25
Hamilton st.....	Gould and Billings sts.....	"	"	165
Gould st.	Spring and Hamilton sts.....	"	"	176
Montclair ave.	South from Fletcher st.....	"	"	275
Gardner st.....	Spring and Baker sts.	"	"	242
Weld st.	At Walter st.	"	"	51
Belgrade ave.	Lorraine and Montello sts.....	"	"	237
Jamaicaway	At Pond st....	"	"	28
"	" Perkins st.....	"	"	17
Arborway	" Forest Hills st.....	"	"	22
Angell st.....	Blue Hill ave. and Canterbury st.	"	"	431
Park st.....	Montview and Corey sts.....	"	"	459
Williams st.	Washington and Stedman sts.....	"	"	285
Forest Hills st.....	From Morton st.....	"	"	387
Selwyn st.	Mozart ave. and Walter st.....	"	"	499
Corey road.....	Summit ave. and Washington st.....	Bri.	"	228
Litchfield st.....	Ascot and Dumas st.....	"	"	586
Kenrick st.....	Foster st. and Lake st.....	"	"	279
Water st.....	Warren ave. and Charles River ave. ..	Chs'n.	"	6
"	At Wapping st.	"	"	4
Byron st.....	Saratoga and Bennington sts.....	E. B.	"	83
Frankfort st.....	Off Maverick st.....	"	"	45
Marginal st.....	East of Jeffries st.....	"	"	48
	<i>Carried forward</i>			24,042

Statement of Main Pipe Extended.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			24,042
Squantum st.....	Atlantic st. and Moon Island road	Quincy.	12-in.	7,950
Atlantic st.....	Hancock and Squantum sts.....	"	"	3,178
Hancock st.	Atlantic ave. and drawbridge	"	"	1,545
Moon Island road (contract).....	Between Squantum and Moon Isl- and.....		"	6,002
	Total 12-in.....			42,717
Summer st.....	Gilbert pl. and Dorchester ave.	C. P.	10-in.	254
Dorchester ave.....	Summer st. and bridge	"	"	1,387
Capen st.....	From Fairmount st.....	Dor.	"	56
Roxton st.....	Glenway and Greenwood sts.....	"	"	48
Normandy st.....	From Columbia road.....	"	"	172
Saxton st.	Hartland and Romsey sts.....	"	"	200
Normandy st.....	From Columbia road.....	"	"	27
Sterling st.....	Tremont and Newbern sts.	Rox.	"	97
Brandon st.	Dudley ave. and Penfield st.	W. R.	"	183
Westbourne road....	Beech and Cornell sts.....	"	"	496
Colberg ave.....	Arden and Rexham sts.....	"	"	108
Fairbanks st.....	Washington and Faneuil sts.	Bri.	"	861
Webster st.....	At Cottage st.....	E. B.	"	7
Chelsea st.....	North of Marion st.	"	"	9
	Total 10-inch.....			3,905
St. James ave.....	From Dartmouth st.....	C. P.	8-in.	100
Avon st.....	Washington and Chauncy sts.....	"	"	43
Proposed street	From Fairmount st.....	Dor.	"	20
Waldeck street.....	At Alpha road.....	"	"	5
Carlisle st.....	Brent st. and Welles ave.....	"	"	196
Greenwood st.....	May and Roxton sts.....	"	"	180
Nightingale st.....	Bicknell st. and Talbot ave.....	"	"	758
Carlisle st.....	Centre and Brent sts.	"	"	355
" "	Brent st. and Welles ave.....	"	"	146
Fenton st.....	Duncan and Clayton sts.....	"	"	120
Duncan st.....	Granger and Fenton sts.	"	"	185
	<i>Carried forward</i>			2,108

Statement of Main Pipe Extended. — Continued.

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			2,108
Duncan st.....	Leonard and Granger sts.....	Dor.	8-in.	100
Torrey st.....	Withington and Gordon sts.....	"	"	120
" "	Leonard and Chipman sts.....	"	"	180
Greenwood st.....	May and York sts.....	"	"	24
Willowood st.....	Lauriat ave. and Harwood st.....	"	"	181
York st.....	From Glenway st.....	"	"	290
Lindsay st.....	" Greenbrier st.....	"	"	198
Raven st.....	" Crescent ave.	"	"	175
Bullard st.....	" Rosseter st.	"	"	195
Raven st.....	" Crescent ave.	"	"	286
Mt. Ida road.....	" Bowdoin st.....	"	"	773
Stanwood st.	At Columbia road.....	"	"	20
Ballou ave.....	From Jones ave.....	"	"	167
Rosseter st.	At Bullard st.....	"	"	11
Saxton st.	Belfort and Romsey sts.....	"	"	282
Holden st.	At Columbia road.....	"	"	94
Binford st.	From A st.....	S. B.	"	500
Cipher st.....	At D st.	"	"	10
Anchor st.....	" " "	"	"	10
Langdon st.....	George st. and Norfolk ave.	Rox.	"	313
Turner st.	At Astor st.	"	"	6
West Walnut pk.....	Copley st. and Amory st.....	"	"	712
Copley st.	West Walnut pk. and Columbus ave...	"	"	296
Iroquois st.....	Calumet and Hillside sts.....	"	"	1,009
Bryant st.	St. Stephen st. and Huntington ave. ..	"	"	229
Idley road	Walnut ave. and Washington st.	"	"	363
Vila st.	Across Francis st.	"	"	52
" "	" Kenwood road.....	"	"	58
New street off Peterborough st. (next to Jersey st.).....	Across Peterborough st.....	"	"	51
Queensbury st.....	Audubon road and Audubon road....	"	"	1,799
New street off Queensbury st. (next to Jersey st.).....	Across Queensbury st.	"	"	55
Whittemore st.....	Montview and Crest sts.....	W. R.	"	381
	<i>Carried forward</i>			11,048

Statement of Main Pipe Extended. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			11,048
Montview st.	Park and Mt. Vernon sts.	W. R.	8-in.	352
Clifford st.....	Canterbury st. and Grew ave.....	"	"	156
Malcolm st.....	Colberg and Belgrade aves.	"	"	213
Brandon st.	Amherst and Linden sts.....	"	"	176
Aldrich st.....	Beech and Cornell sts.....	"	"	230
Cornell st.....	Poplar and Kittredge sts.	"	"	727
South Fairview st. ...	Across Roberts st.	"	"	50
South Walter st.....	South and South Fairview sts.	"	"	362
Rowe st.....	Allen and Ashland sts.....	"	"	318
Mt. Vernon st.	At Garfield ave.	"	"	50
Garfield ave.....	Mt. Vernon and Corey sts.	"	"	957
Montello st.	Belgrade and Colberg aves.	"	"	237
Cass st.....	Across Spring st.	"	"	57
"	Oak ave. and Powell st.	"	"	152
Arborway	Across Pond st.....	"	"	63
Winslow st.	Perham and Temple sts.....	"	"	150
Bourne st.....	Catherine and Canterbury sts.	"	"	409
Sycamore st.	Hawthorne and Ashland sts.....	"	"	221
Selwyn st.....	Knoll and Walter sts.....	"	"	9
Malvern st.....	Brighton ave. and Ashford st.	Bri.	"	730
Chiswick road.....	Chestnut Hill ave. and Sidlaw road...	"	"	606
George st.	At Spring st.....	"	"	10
Wirt st.....	Henshaw and Washington sts.....	"	"	285
Princeton st.....	At Marion st.	E. B.	"	2
Hancock st.	Atlantic ave. and drawbridge.....	Quincy	"	21
	Total 8-inch.....			<u>17,591</u>
Charlesgate East....	At Ipswich st.....	C. P.	6-in.	8
Roosevelt st.	Camden and Northampton sts.....	"	"	377
Massachusetts ave. ..	At N.Y., N.H. & H. R.R.....	"	"	63
Trinity pl.....	St. James ave. and Stuart st.	"	"	173
Stuart st.....	Dartmouth st. and Trinity pl.....	"	"	293
Avon st.....	Washington and Chauncey sts.....	"	"	4
Springfield st.....	At Shawmut ave.	"	"	3
Bellevue st.	Columbia road and Trull st.....	Dor.	"	164
	<i>Carried forward</i>			1,085

Statement of Main Pipe Extended.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			1,085
Mora st.	Milton ave. and Washington st.	Dor.	6-in.	300
Wave ave.	From Savin Hill ave.	"	"	143
Auckland st.	Savin Hill ave. and Bay st.	"	"	21
Columbia road.	Washington and Seaver sts.	"	"	12
Dawson st.	Mallett and Templeton sts.	"	"	154
Corona st.	Bowdoin st. and Geneva ave.	"	"	165
Selden st.	Capen st. and Milton ave.	"	"	333
Leedsville st.	Adams st. and Dorchester ave.	"	"	293
New street off Leeds- ville st. ....	.....	"	"	23
Carlos st.	Lauriat and Chapman aves.	"	"	27
Maryland st.	Bay st. and Savin Hill ave.	"	"	93
Alpha road.	From Waldeck st.	"	"	160
Brent st.	At Carlisle st.	"	"	32
Nottingham st.	Bowdoin ave. and Bullard st.	"	"	76
Carmen st.	From Faxon st.	"	"	52
Joseph st.	" Carlisle st.	"	"	23
Ridge road	" Park st.	"	"	345
Nottingham st.	Bowdoin ave. and Bullard st.	"	"	36
Gardner ave.	From Savin Hill ave.	"	"	43
Greenwich pl.	Freeport st. and Dorchester ave.	"	"	90
Withington st.	Euclid st. and Torrey st.	"	"	85
Whitby terrace.	From Pleasant st.	"	"	225
Wales st.	At Nightingale st.	"	"	45
Peverell st.	Salcombe st. and Sawyer ave.	"	"	369
New Seaver st.	Erie st. and Columbia road.	"	"	119
Houghton st.	Mill st. and Tileston pl.	"	"	298
Burt ave.	Washington and Ashmont sts.	"	"	232
White terrace.	Lauriat and Jones aves.	"	"	87
Johnston terrace.	From Lauriat ave.	"	"	170
Downer ave.	Sawyer ave. and Pleasant st.	"	"	126
Harwood st.	From Willowwood st.	"	"	270
Spencer st.	West Park and Athelwold sts.	"	"	52
Devon st.	Columbia road and Blue Hill ave.	"	"	260
Avondale ter.	From Richmond st.	"	"	274
	<i>Carried forward</i>			6,123

Statement of Main Pipe Extended.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			6,123
St. Gregory's ct.....	From Avondale ter.....	Dor.	6-in.	3
Middleton ave.....	" Norfolk st.....	"	"	129
Elmo st.	" Erie st.	"	"	283
Dakota st.....	Greenbrier and Washington sts.	"	"	502
Claybourne st.	Dakota and Bowdoin sts.....	"	"	483
Hartland st.....	From Saxton st.	"	"	112
Potosi st.....	Percival ave. and Mt. Ida road.....	"	"	384
Draper st.....	From Bowdoin st.	"	"	604
Wilder road.....	" Columbia road.....	"	"	25
Pinckney road	" " "	"	"	25
Michigan ave.....	" " "	"	"	27
Seaver st.....	At Columbia road.....	"	"	58
Proposed st.....	From east side of Columbia road.....	"	"	17
" "	" west " " " "	"	"	18
Bowdoin ave.	" Columbia road.....	"	"	24
Columbia road.....	Geneva ave. and railroad.....	"	"	1,780
Devon st.....	East of Columbia road	"	"	27
Proposed st.....	Off west side of Columbia road be- tween Brunswick st. and railroad...	"	"	18
" "	Off west side of Columbia road be- tween Brunswick st. and railroad...	"	"	18
Columbia pl.	From Columbia road.....	"	"	23
" road.....	Railroad and Quincy st.....	"	"	550
" "	Quincy st. and Glendale st.....	"	"	698
" "	Glendale and Hancock st.	"	"	154
" "	Edward Everett sq. and Holden st. ...	"	"	947
Edward Everett sq..	At Columbia road.....	"	"	8
Mt. Everett st.....	From Quincy st.	"	"	23
Stanley st.....	Quincy and Bellevue sts.	"	"	105
Rockwell st.....	Washington st. and Milton ave.	"	"	307
Massasoit ave.....	From Talbot ave.	"	"	505
Jones ave.....	White ter. and Ballou ave.	"	"	213
Columbia road.....	Blue Hill ave. and Washington st....	"	"	400
" "	Geneva ave. and Washington st.....	"	"	658
Gayland ave.....	From Judson st.....	"	"	265
	<i>Carried forward</i>			15,516

Statement of Main Pipe Extended.—Continued.

In What Street.	Between What Streets.	District.	Size.	Length.
	<i>Brought forward</i>			15,516
Brunswick st.	At Columbia road.....	Dor.	6-in.	24
Magnolia sq.	From Magnolia st.	"	"	55
Dean ave.	Howard ave. and Judson st.	"	"	15
Dudley st.	Howard ave. and W. Cottage st.	"	"	365
W. Cottage st.	From Dudley st.	"	"	109
Half Moon st.	From Magnolia st.	"	"	347
Wales pl.	At Columbia road	"	"	19
Columbia road (con- tract).	Dudley and Pond sts.	"	"	617
Gold st.	A and B sts.	So. B.	"	105
Peters st.	Sixth and Seventh sts.	"	"	300
I st.	At Second st.	"	"	9
O st.	" Columbia road.	"	"	11
East Broadway.	N and O sts.	"	"	182
Dove ct.	From Dove st.	Rox.	"	133
Wabeno st.	Wabon and Wyoming sts.	"	"	260
Ball st.	At Shawmut ave.	"	"	5
Waumbeck st.	Humboldt ave. and Harold st.	"	"	495
Penryth st.	Across Columbus ave.	"	"	29
Culbert pl.	" " "	"	"	64
Decatur ave.	" " "	"	"	29
Cherokee st.	Hillside and Pontiac sts.	"	"	234
Astor st.	Massachusetts ave. and Hemenway st.	"	"	910
Whipple st.	At Astor st.	"	"	8
Columbus ave.	Centre and Dimock sts.	"	"	547
Madison st.	At Shawmut ave.	"	"	6
Ernst st.	W. Walnut pk. and Bragdon st.	"	"	369
Miles st.	" " " " " "	"	"	318
Arklow st.	Walden and Round Hill sts.	"	"	87
Kenwood road.	Brookline and Huntington aves.	"	"	1480
New st. off Kenwood road, 1st from Hun- tington ave.	Across Kenwood road.	"	"	56
New st. off Kenwood road, 2d left from Huntington ave.	" " "	"	"	35
	<i>Carried forward</i>			22,739

Statement of Main Pipe Extended. — *Continued.*

In What Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			22,739
New st. off Francis st., 1st from Huntington ave.....	Across Francis st.....	Rox.	6-in.	53
New street off Francis st., 2d right from Huntington ave....	" " "	"	"	13
Binney st.....	Across Francis st.	"	"	14
St. Stephen st.....	Bryant and Gainsboro sts.	"	"	843
New st., off St. Stephen st., 1st left from Bryant.....	Across St. Stephen st.	"	"	37
New st., off St. Stephen st., 1st right from Bryant.....	" " " "	"	"	20
New st., off St. Stephen st., 2d left from Bryant.....	" " " "	"	"	37
Harold st.	Munroe st. and Walnut ave.....	"	"	397
Stony Brook pl.....	Columbus ave. and Centre st.....	"	"	107
Newbury st.....	Across Brookline ave.....	"	"	42
Bray st.	Columbus ave. and Washington st. ...	"	"	328
Bragdon st.....	" " " Amory st.	"	"	635
Peterborough st.	Audubon road and Audubon road	"	"	1,883
Brookledge st.	Humboldt ave. and Elm Hill ave.. ...	"	"	305
Hartwell st.	Georgia and Schuyler sts.....	"	"	533
Greenville st.....	Dudley and Winthrop sts.....	"	"	4
Potomac st.....	Mt. Vernon and Yorktown sts.....	W. R.	"	917
Otis pl.	Off Norfolk st.....	"	"	133
Durant st.....	Off Baker st.....	"	"	592
Woodman st.....	St. Joseph and Jamaica sts.	"	"	72
St. Joseph st.....	Woodlawn and South sts.....	"	"	160
Sylvia st.	Forest Hills and Washington sts.	"	"	100
Francis st.....	At Mt. Vernon st.....	"	"	4
Rhoda st.....	From Central st.	"	"	172
Newberg st.	Berry and Cornell sts.	"	"	204
Congreve st.....	South and Centre sts.....	"	"	312
So. Conway st.....	At So. Fairview st.	"	"	28
So. Fairview st.....	So. Walter and Roberts sts.....	"	"	34
Alaric st.....	Across Spring st.....	"	"	55
	<i>Carried forward</i>			30,773

Statement of Main Pipe Extended. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			30,773
Orange st.....	Cornell and Beech sts.....	W. R.	6-in.	329
Rexham st.....	Belgrade and Colberg aves.....	"	"	48
March ave.	Park and Bellevue sts.....	"	"	275
Stony Brook st.	Williams and Keyes sts.....	"	"	154
Mozart ave.....	Selwyn and Walter sts.....	"	"	175
Arborway	At Forest Hills st.	"	"	13
Sycamore st.....	At Prospect ave.....	"	"	272
Prospect ave.....	" Sycamore st.....	"	"	86
Brook st.....	" " "	"	"	120
Leicester st.....	Washington and Surrey sts.....	Bri.	"	239
Surrey st.....	Market and Leicester sts.....	"	"	171
Portsmouth st.....	Lincoln and School sts.....	"	"	178
Beacon st.....	Chestnut Hill ave. and Brookline line,	"	"	68
Hardwick st.....	Dunboy and Bigelow sts.....	"	"	180
Willard pl.....	From North Harvard st.....	"	"	354
Gardner st.....	Across Malvern st.....	"	"	66
Lothian road.....	" Chiswick road.....	"	"	37
Ascot st.....	At Litchfield st.....	"	"	5
Benson st.....	" " "	"	"	5
Cygnat st.....	" " "	"	"	5
Spring st.....	Murdock and Etna sts.	"	"	354
" "	George and " "	"	"	136
Etna st.....	North Beacon and Spring sts.....	"	"	226
" "	Cypress road and Elmira st.....	"	"	339
Ridge road.....	At Etna st.....	"	"	3
Wicklow st.....	Market and North Beacon sts.....	"	"	264
Sparhawk st.....	Murdock and Cambridge sts.....	"	"	210
Essex st.....	Commonwealth ave. and Charles river,	"	"	3
Oak Square ave.....	Washington and Faneuil sts.	"	"	997
Peaceable st.....	Rockland and Winship sts.....	"	"	78
Henshaw st.....	Market and Bentley sts.....	"	"	335
" "	Menlo and Cambridge sts.....	"	"	345
Shelby st.....	Princeton and Saratoga sts.....	E. B.	"	154
Meridian st.....	At Falcon st.....	"	"	36
	<i>Carried forward</i>			37,033

Statement of Main Pipe Extended. — *Concluded.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			37,033
Marginal st.	East of Jeffries st.	E. B.	6-in.	6
Putnam st.	East Eagle and Falcon sts.	"	"	144
Trenton st.	At Meridian st.	"	"	10
Monmouth st.	" " "	"	"	10
Eutaw st.	" " "	"	"	8
Princeton st.	" Marion st.	"	"	2
" "	" Prescott st.	"	"	2
Titus road. ....	.....	Quincy.	"	667
Hancock st.	Atlantic ave. and drawbridge	"	"	9
	Total 6-inch			37,891
Battery st.	Commercial st. and ferry-house	C. P.	4-in.	18
Court, off Leonard st.,	.....	Dor.	"	6
	Total 4-inch			24

Statement of Private Mains Laid during the Year
ending January 31, 1899.

For whom Laid.	Where Laid.	Size.	Length.
Boston Fire Dept. (salt-water main)	Central wharf, between Atlantic ave. and water front	12-in.	680
Boston Terminal Co.	In yard, between Dorchester and Atlantic aves.	"	562
" " "	In yard, between Dorchester and Atlantic aves.	6-in.	24
Insane Hospital Trustees,	Austin Farm, between Harvard and Canterbury sts.	8-in.	1,195
" " "	Austin Farm, between Harvard and Canterbury sts.	6-in.	22
" " "	Austin Farm, between Harvard and Canterbury sts.	4-in.	6
Pauper Institutions Trustees.	Long Island, from reservoir to piggery and ice pond.	"	731
	Total number of feet.		3,220

Statement of Main Pipe Raised, Lowered, and Moved Laterally.

In what Street.	Between what Streets.	District.	Size.	Length.	Raised, Lowered or Moved.
Court st.	Brattle st. and Cornhill.	C. P.	12-in.	200	Lowered.
Way st.	At Harrison ave.	"	"	375	"
Walk Hill st.	Norfolk and Blue Hill aves.	Dor.	"	145	"
North Beacon st.	Parsons st. and Barker's lane. ...	Bri.	"	449	"
Brattle st.	At Court st.	C. P.	8-in.	12	"
Brookline ave.	Across B. & A. R.R. bridge.	"	"	82	Moved.
South Walter st.	South and South Fairview sts.	W. R.	"	57	Raised.
Summer st.	Powell and Autumn sts.	"	"	86	Lowered.
Harwich st.	At Dartmouth st.	C. P.	6-in.	163	Raised.
Springvale ave.	From Spring st.	W. R.	"	141	Lowered.
Charlesgate-East ...	At Ipswich st.	C. P.	"	96	"
	Total number of feet			1,806	

Statement of Main Pipe Abandoned.

In what Street.	Between what Streets.	District.	Size.	Length.
Tremont st.	At Common st.	C. P.	30-in.	12
" "	" Castle sq.	"	"	300
	Total 30-inch			312
Columbia road.	Edward Everett sq. and Dudley st. ...	Dor.	20-in.	884
Huntington ave.	At Dartmouth st.	C. P.	"	4
	Total 20-inch.			888
Beverly st.	Opp. Fitchburg depot.	C. P.	16-in.	3
Tremont st.	School st. and Scollay sq.	"	"	4
Blue Hill ave.	At Walk Hill st.	Dor.	"	50
Columbia road.	Dudley and Edward Everett sqs.	"	"	478
Congress st.	At railroad tracks.	So. B.	"	11
Dorchester st.	" railroad bridge.	"	"	30
Warren ave.	Front st. and City sq.	Chn.	"	7
Chelsea st.	Cor. of City sq.	"	"	8
	Total 16-inch.			591

Statement of Main Pipe Abandoned. — Continued.

In what Street.	Between what Streets.	District.	Size.	Length.
Blackstone st.....	At Clinton st.	C. P.	12-in.	16
West Newton st.	Shawmut ave. and Tremont st.	"	"	12
Pleasant st.	Opp. Melrose st.	"	"	7
" "	Opp. Tennyson st.	"	"	3
" "	At " "	"	"	5
" "	Opp. Piedmont st.	"	"	4
Columbus ave.	Junc. Grenville pl. and Ferdinand st..	"	"	4
Commercial st.	15 ft. south of No. 445-7....	"	"	5
Massachusetts ave. ..	At Dundee st.	"	"	4
Huntington ave.	" Dartmouth st.	"	"	25
Harrison ave.	" Randolph st.	"	"	3
" "	" Genesee st.	"	"	3
Harvard st.	Near No. 17.	"	"	4
Way st.	Harrison ave. and Albany st.	"	"	480
Fleet st.	At Moon st.	"	"	4
North st.	Junction Lewis st.	"	"	5
Court st.	Hanover st. and Cornhill.	"	"	220
Hanover st.	East of Court st.	"	"	4
Prince st.	At Bennet ave.	"	"	4
Leverett st.	" Causeway st.	"	"	9
Commercial st.	State and Clinton sts.	"	"	500
Castle st.	Tremont and Albion sts.	"	"	153
" "	West line of Middlesex st.	"	"	5
Federal st.	Kneeland st. and bridge.	"	"	1,056
Berkeley st.	Chandler " " "	"	"	263
Tremont st.	At Castle st.	"	"	50
Atlantic ave.	" Summer st.	"	"	4
Canal st.	Near Travers st.	"	"	9
Washington st.	Opp. Jordan, Marsh & Co.	"	"	3
Way st.	Harrison ave. and Albany st.	"	"	20
Berkeley st.	Chandler st. and bridge	"	"	34
Tremont st.	At Castle sq.	"	"	70
Northampton st.	" Shawmut ave.	"	"	24
Columbia road	Glendale and Davenport sts.	Dor.	"	770
Ashmont st.	Neponset ave. and Train st.	"	"	360
	<i>Carried forward</i>			4,142

Statement of Main Pipe Abandoned.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			4,142
Columbia road	Washington st. and Geneva ave.....	Dor.	12-in.	650
Bowdoin st.	Holiday and Topliff sts.....	"	"	466
Columbia road.....	Wales pl. and railroad.....	"	"	348
Eric st.....	At Hewins st.....	"	"	15
Bernard st.....	" Helen st.....	"	"	14
Morton st.	Opp. Fuller st.....	"	"	12
Norfolk st.	At Morton st.....	"	"	5
River st.....	Opp. Morton st.....	"	"	20
Erie st.....	At New Seaver st.	"	"	12
Glenway st.....	" York st.....	"	"	12
Neponset ave.....	" Mill st.....	"	"	12
Park st.	Dorchester and Geneva aves.	"	"	12
Washington st.....	At Columbia road.....	"	"	40
Geneva ave.....	" " "	"	"	60
Columbia road	Geneva ave. and railroad.....	"	"	545
" "	Railroad and Quincy st.....	"	"	766
" "	Quincy and Glendale sts.....	"	"	733
" "	Edward Everett sq. and Dudley st. ...	"	"	1,585
Dudley st.....	At Columbia road	"	"	47
East Cottage st.	West of Columbia road.....	"	"	5
Neponset ave.....	Minot and Walnut sts.....	"	"	277
Ruggles st.....	At Shawmut ave.	Rox.	"	20
Vernon st.....	" " "	"	"	10
Columbus ave.	" New Heath st.	"	"	12
" "	" Old Heath st.	"	"	12
" "	" New Heath and Old Heath sts.	"	"	30
Walnut ave.....	Buena Vista and Rockland sts.	"	"	8
Ritchie st.	At Columbus ave.....	"	"	13
La Grange st.	Centre and Pleasant sts.....	W. R.	"	695
" "	Centre st. and N. Y., N. H. & H. R.R..	"	"	309
Keyes st.	Washington st. and N. Y., N. H. & H. R.R.....	"	"	476
Catalpa st.....	At Perkins st.....	"	"	3
Washington st.....	" Keyes st.....	"	"	20
Spring st.....	Centre and Gardner sts.....	"	"	956
	<i>Carried forward</i>			12,342

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			12,342
South st.....	Brandon and Conway sts.....	W. R.	12-in.	183
Florence st.....	Ashland and Sycamore sts.....	"	"	18
Park st.....	At Centre st.....	"	"	16
Market st.....	" North Beacon st.....	Bri.	"	10
North Beacon st.....	Parsons st. and Barker's lane.....	"	"	21
" " "	At Market st.....	"	"	12
Brooks st.....	" Faneuil Station	"	"	26
Charles River ave...	Water st. and City sq.....	Chs'n.	"	11
Haynes st.....	Orleans and Marginal sts.....	E. B.	"	8
Byron st.....	At Saratoga st.....	"	"	5
Gove st.....	Chelsea and Bremen sts.....	"	"	4
Chelsea st.....	At Wesley st.....	"	"	6
London st.....	" Porter st.....	"	"	6
Chelsea st.....	North of Marion st.....	"	"	4
Webster st.....	At Cottage st.....	"	"	8
Saratoga st.....	" Trumbull st.....	"	"	6
Sumner st.....	" Jeffries st.....	"	"	10
Saratoga st.....	" Swift st.....	"	"	3
Bremen st.....	" Gove st.....	"	"	6
	Total 12-inch.....			<u>12,705</u>
Minot st.....	Opp. Wall st.....	C. P.	10-in.	12
Medway st.....	Over railroad bridge.....	Dor.	"	26
La Grange st.....	Centre st. and N.Y., N.H. & H. R.R....	W. R.	"	320
Byron st.....	At Saratoga st.....	E. B.	"	5
Gove st.....	Chelsea and Bremen sts.....	"	"	3
Chelsea st.....	North of Marion st.....	"	"	15
Webster st.....	At Cottage st.....	"	"	2
	Total 10-in.....			<u>383</u>
Brookline ave.	On B. & A. R.R. bridge.....	C. P.	8-in.	15
Tremont st.	Pleasant and Warrenton sts.....	"	"	205
Brattle st.	At Court st.....	"	"	37
Furnace st.....	Federal st. and Cove pl.....	"	"	215
Cove st.	Cove pl. and Kneeland st.....	"	"	85
	<i>Carried forward</i>			557

Statement of Main Pipe Abandoned.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			557
Summer st.....	Atlantic and Dorchester aves.....	C. P.	8-in.	572
“	Atlantic ave. and Gilbert pl.....	“	“	565
Quincy st.....	At Columbia road.....	Dor.	“	147
Glendale st.	“ “ “	“	“	37
Quincy st.....	Columbia road and Stanley st.....	“	“	60
Holden st.....	At Columbia road.....	“	“	26
Rosseter st.....	“ Bullard st.....	“	“	4
Ballou ave.....	From Jones ave.....	“	“	50
Nightingale st.	Bicknell and Wales st.....	“	“	60
Wensley st.....	At Bickford ave.....	Rox.	“	43
Boylston ave.	Porter and Cornwall sts.	W. R.	“	80
Powell st.	Spring and Summer sts.....	“	“	135
Summer st.....	Powell and Autumn sts.....	“	“	19
South Walter st.	Roberts and South Fairview sts.	“	“	8
Jordan st.	La Grange and Dent sts.....	“	“	235
Morton st.....	At Forest Hills st.	“	“	16
Englewood ave.....	“ Strathmore road	Bri.	“	12
Chiswick road.	“ Commonwealth ave.....	“	“	16
Water st.	“ Gray st.	Chs'n.	“	56
Mead st.....	At Bunker Hill st.....	“	“	3
Water st.....	Warren and Charles River aves.....	“	“	248
Charles River ave....	Water st. and City sq.....	“	“	4
Water st.....	At Wapping st.....	“	“	34
Bunker Hill st.....	North of Short st.....	“	“	6
“ “ “	At “ “	“	“	6
Princeton st.....	“ Marion st.....	E. B.	“	14
Chelsea st.....	Near Curtis st.....	“	“	3
	Total 8-inch.....			3,010
Cazenove st.....	From Chandler st.....	C. P.	6-in.	150
Harwich st.....	At Dartmouth st.....	“	“	12
Orange st.....	Washington st. and Shawmut ave. ...	“	“	300
Orange lane.....	Washington st. and Harrison ave.	“	“	200
Massachusetts ave. (south side).....	At Shawmut ave.....	“	“	15
	<i>Carried forward</i>			677

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward.....</i>			677
Chester pl.....	At Shawmut ave.....	C. P.	6-in.	8
Camden st.....	" " "	"	"	10
Sawyer st.....	" " "	"	"	4
Lenox st.....	" " "	"	"	10
Woodbury st.....	" " "	"	"	4
Kendall st.....	" " "	"	"	4
Hammond st.....	" " "	"	"	11
Shawmut ave.....	West Newton and Rutland sts.....	"	"	36
Fayette st.....	Cor. Church st.....	"	"	4
Melrose st.....	200 feet from Pleasant st.....	"	"	4
" "	Cor. Pleasant st.....	"	"	4
Worcester st.....	At Shawmut ave.....	"	"	12
Norman st.....	Green and Merrimac sts.....	"	"	600
Avon st.....	Washington and Chauncy sts.....	"	"	65
Springfield st.....	At Shawmut ave.....	"	"	9
Tennyson st.....	Cor. Church st.....	"	"	4
" "	Junction Church st.	"	"	9
Cortes st.....	Ferdinand and Berkeley sts.....	"	"	14
Winchester st.....	Corner Church st.....	"	"	4
" "	Westerly line of Church st.....	"	"	4
" "	Easterly " " " "	"	"	4
South Margin st.	Pitts and Staniford sts.....	"	"	543
Kneeland st.	At Whitmore st.	"	"	9
Winchester st.....	Junction Church st.	"	"	6
Shawmut ave.	Rutland st. and Massachusetts ave....	"	"	995
Massachusetts ave....	Opposite No. 621	"	"	4
" " ...	" " 690	"	"	4
" " ...	210 feet west of Harrison ave.	"	"	4
" " ...	Opposite No. 677	"	"	4
" " ...	450 feet west of Harrison ave.....	"	"	3
" " ...	Near No. 545	"	"	4
" " ...	Opposite No. 563	"	"	4
" " ...	" " 527	"	"	4
Piedmont st.	About 50 feet easterly from Church st.	"	"	4
	<i>Carried forward.....</i>			3,089

Statement of Main Pipe Abandoned.—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			3,089
Piedmont st.	200 feet from Ferdinand st.	C. P.	6-in.	4
“ “	Corner Ferdinand st.	“	“	4
Grenville pl.	At Columbus ave.	“	“	4
“ “	Columbus ave. and Church st.	“	“	4
Massachusetts ave.	About 100 feet east of No. 536.	“	“	3
“ “ ...	Opposite No. 536	“	“	4
St. James ave.	Berkeley and Clarendon sts.	“	“	4
“ “ “	“ “ “ “	“	“	4
Berkeley st.	Opposite St. James ave.	“	“	4
Massachusetts ave.	“ No. 558	“	“	4
“ “ ...	190 feet west of Shawmut ave.	“	“	4
Dartmouth st.	At Huntington ave.	“	“	25
Oxford st.	Near No. 17	“	“	4
Edinboro st.	“ “ 21	“	“	4
Kneeland st.	At Whitmore st.	“	“	9
Tyler st.	Oak and Curve sts.	“	“	245
Kneeland st.	At Tyler st.	“	“	5
Fulton st.	“ Ferry st.	“	“	10
Tyler st.	“ Kneeland st.	“	“	4
Kneeland st.	“ Hudson st.	“	“	6
“ “	Junction of Hudson st.	“	“	4
Hudson st.	Between Harvard and Kneeland sts. .	“	“	4
Hull st.	Salem and Snowhill sts.	“	“	541
“ “	Snowhill and Commercial sts.	“	“	351
St. James st.	Dartmouth and Clarendon sts.	“	“	30
“ “ “	At Clarendon st.	“	“	4
Margaret st.	Cor. of Sheafe st.	“	“	5
“ “	At “ “	“	“	4
Sheafe st.	Snowhill and Margaret sts.	“	“	3
“ “	Cor. of Snowhill st.	“	“	4
No. Hudson st.	At Snowhill st.	“	“	4
Dartmouth st.	Buckingham st. and railroad bridge. .	“	“	60
Moon st.	At Fleet st.	“	“	3
Snowhill st.	Cor. of No. Hudson st.	“	“	4
	<i>Carried forward</i>			4,465

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			4,465
Tileston st.....	Wiggin and Hanover sts.....	C. P.	6-in.	3
Fulton st.....	Cor. of Lewis st.....	"	"	4
Clark st.....	Hanover and North sts.....	"	"	4
" ".....	Cor. of North st.....	"	"	4
North Bennet st.....	At Hanover st.....	"	"	4
Hanover st.....	Mechanics ct. and Board alley.....	"	"	4
Haverhill st.....	200 ft. north of Travers st.....	"	"	10
Mt. Washington ave..	Federal st. and bridge.....	"	"	450
Shaving st.....	From Mt. Washington ave.....	"	"	40
North Bennet st.....	At Bennet ave.....	"	"	5
North Centre st.....	Hanover and North sts.....	"	"	4
So. Market st.....	From Commercial st.....	"	"	6
" " ".....	Commercial st. and Merchants row....	"	"	6
No. Market st.....	From Commercial st.....	"	"	6
Commerce st.....	" " ".....	"	"	6
Chatham st.....	" " ".....	"	"	6
Blackstone st.....	At Hanover st.....	"	"	4
Pitts st.....	" Pitts-st. ct.....	"	"	3
Sheafe st.....	Snowhill and Salem sts.....	"	"	476
Snowhill st.....	Opp. Sheafe st.....	"	"	3
Market st.....	At Merrimac st.....	"	"	4
Friend st.....	175 feet from Market st.....	"	"	4
" ".....	North side " ".....	"	"	4
" ".....	South " " ".....	"	"	4
Court st.....	Cornhill and Franklin ave.....	"	"	231
Albion st.....	Castle and Paul sts.....	"	"	82
Paul st.....	Albion and Tremont sts.....	"	"	165
Mt. Washington ave..	.....	"	"	65
Kneeland st.....	Federal st. and Atlantic av. (Cove st.)	"	"	260
Dartmouth st.....	Columbus ave. and R.R. bridge.....	"	"	185
Worcester st.....	At Shawmut ave.....	"	"	12
Concord st.....	Near Cumston st.....	"	"	6
" ".....	At James st.....	"	"	3
Cumston st.....	" Concord st.....	"	"	24
	<i>Carried forward</i>			6,562

Statement of Main Pipe Abandoned—*Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			6,562
Estes pl.....	From Summer st.	C. P.	6-in.	3
Gilbert pl.	" " "	"	"	30
Neponset ave.....	Ashmont st. and bridge.....	Dor.	"	2,990
Geneva ave.....	Blue Hill ave. and Wilder st.....	"	"	506
Westville st.....	Bowdoin st. to Bowdoin sq.	"	"	339
Draper st.....	Robinson and Westville sts.....	"	"	145
Greenwich st.....	Dorchester ave. and Duncan st.....	"	"	212
Spencer st.	Wheatland and Talbot aves.....	"	"	418
Neponset ave.....	At Neponset bridge.....	"	"	120
Glendale st.	East of Columbia road.	"	"	112
Clayton st.	At Freeport st.....	"	"	28
Saxton st.	Belfort and Romsey sts.....	"	"	78
Columbia road.....	Blue Hill ave. and Washington st.....	"	"	1,056
Devon st.	West of Columbia road.....	"	"	30
Bellevue st.	From Columbia road.....	"	"	44
Bodwell st.....	" " "	"	"	20
Bird st.....	" " "	"	"	24
Sawyard st.	" " "	"	"	24
Hamlet st.	" " "	"	"	22
Eastman st.	" " "	"	"	23
Albert st.....	At Adams st.....	"	"	5
Seaver st.....	" Columbia road	"	"	7
Granger st.....	Near Duncan st.....	"	"	4
Jones ave.....	White ter. and Ballou ave.	"	"	72
Centre st.....	Near Adams st.....	"	"	72
Greenwich st.	At Clayton st.....	"	"	20
Belfort st.	" Saxton st.	"	"	3
Columbia road	Wolcott and Blue Hill aves.....	"	"	404
Mt. Vernon st.	At N.Y., N.H. & H. R R.....	"	"	125
Bellevue st.....	From Columbia road	"	"	31
Glendale st.	East of Columbia road.....	"	"	30
Bodwell st.....	From Columbia road	"	"	30
K st.	South of Ninth st.....	So. B.	"	346
N st.	At Broadway.....	"	"	4
	<i>Carried forward</i>			13,939

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			13,939
Fifth st.	At O st.	B.	6-in.	12
Third st.	“ “ “		“	6
Sixth st.	“ M st.		“	24
“ “	“ O st.		“	24
Seventh st.	“ M st.		“	12
B st.	“ Third st.		“	12
Third st.	“ C st.		“	27
“	“ B st.		“	21
Second st.	“ I st.		“	28
I st.	“ Second st.		“	6
New Heath st.	Columbus ave. and Parker st.	Rox.	“	626
Terrace st.	At New Heath st.	“	“	28
Parker st.	New Heath and Centre sts.	“	“	1,332
Decatur ave.	Across Columbus ave.	“	“	31
Bickford ave.	At Wensley st.	“	“	28
Wensley st.	Heath st. and Bickford ave.	“	“	229
Ball st.	At Shawmut ave.	“	“	2
Windsor st.	“ “ “	“	“	12
Madison st.	“ “ “	“	“	2
Sterling st.	“ “ “	“	“	6
Williams st.	“ “ “	“	“	8
Willow pk.	“ “ “	“	“	5
Clifton st.	From Dudley st.	“	“	100
Winthrop pl.	At Shawmut ave.	“	“	6
Shawmut ave.	Massachusetts ave. and Vernon st.	C. P. and Rox.	“	3,157
Centre st.	At Columbus ave.	Rox.	“	15
Bryant st.	Parker and St. Stephen sts.	“	“	25
Notre Dame st.	Bragdon st. and Dimock st.	“	“	12
Wayne st.	At Blue Hill ave.	“	“	63
Miles st.	At Bragdon st.	“	“	5
Ernst st.	“ “ “	“	“	5
Harold st.	Walnut ave. and Munroe st.	“	“	3
Francis st.	Brookline ave. and Binney st.	“	“	328
Roberts st.	Brookfield and South Walter sts.	W. R.	“	421
	<i>Carried forward</i>			20,560

Statement of Main Pipe Abandoned.— *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			20,560
Brookfield st.....	At Roberts st.....	W. R.	6-in.	12
Springvale st.	At Spring st.....	"	"	39
Chapin ave.	From La Grange st.	"	"	235
Water st.	At Keyes st.	"	"	23
South Fairview st. ...	South and Roberts sts.....	"	"	329
Pleasant st.	At La Grange st.	"	"	7
Arborway.....	Across Morton st.....	"	"	15
Selkirk road.....	At Chiswick road.....	Bri.	"	13
Etna st.....	" Maple ave. and Garden st.....	"	"	8
Sidlaw road	" Chiswick road.....	"	"	6
Gardner st.....	" Malvern st.	"	"	3
20 7-8 Henshaw st.....	Market and Bentley sts.....	"	"	76
Charles River ave. ...	Corner of Water st.....	Chsn.	"	68
Warren ave.....	Front st. and City sq.....	"	"	280
Charles River ave. ...	Water st. and City sq.	"	"	250
Bremen st.	North corner of Gove st.....	E. B.	"	4
" "	South corner of Gove st.....	"	"	6
Gove st.	Chelsea and Bremen sts.....	"	"	216
Chelsea st.....	At Wesley st.	"	"	5
Princeton st.	" Marion st.	"	"	13
" "	" Prescott st.	"	"	12
Chelsea st.....	" Curtis st.	"	"	585
Webster st.....	" Cottage st.....	"	"	2
Bremen st.	" Porter st.	"	"	8
Maverick sq ..	At Henry st.....	"	"	11
Bremen st.....	" Brooks st.....	"	"	5
Byron st.....	Saratoga and Bennington sts.....	"	"	40
Sumner st.....	At Jeffries st.....	"	"	140
	Total 6-inch.....	"	"	22,971
North Hudson st.....	From Snowhill st.....	C. P.	4-in.	28
Arnold st.....	At Shawmut ave.....	"	"	8
Massachusetts ave....	" " "	"	"	63
Battery st.....	Commercial st. and Ferry-house.....	"	"	294
Ferry st.....	At Fulton st.....	"	"	19
	<i>Carried forward</i>			412

Statement of Main Pipe Abandoned. — *Concluded.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			412
Snowhill st.....	Junction of North Hudson st.....	C. P.	4-in.	20
Fulton pl.....	North and Fulton sts.....	"	"	4
Bennet ave.....	Prince and North Bennet sts.....	"	"	227
Wall st.....	Minot and Causeway sts.....	"	"	700
Arnold st.....	At Shawmut ave.....	"	"	8
Bumstead ct.....	From Boylston st.....	"	"	220
Franklin ave.....	At Court st.....	"	"	4
Court sq. (east).....	" " "	"	"	35
" " (west).....	" " "	"	"	35
Lucas st.....	Washington st. and Shawmut ave....	"	"	46
Bay st.....	At Fayette st.....	"	"	32
Jefferson st.....	" " "	"	"	16
Cove pl.....	From Cove st.....	"	"	330
Ashton pl.....	From Charles st.....	"	"	50
Gold st.....	A and B sts.....	S. B.	"	320
Sayward pl.....	At Woodward st.....	"	"	30
Glover's ct.....	" " "	"	"	12
Newbern st (J. P. A.)	Weston and Sterling sts.....	Rox.	"	300
Weston st. "	Cabot and Tremont sts.....	"	"	350
Bromley pk. (so. side)	Bickford and Albert sts.....	"	"	657
" " (no. side)	" " " " "	"	"	661
" st.....	At Bromley pk.....	"	"	25
Orchard st.....	" Orchard "	"	"	6
Bickford ave.....	Heath and Wensley sts.....	"	"	331
" " pl.....	At Bickford ave.....	"	"	11
Adams pl.....	Near Williams st.....	"	"	11
Guild st.....	Washington st. and Lambert ave.....	"	"	763
Clifton st.....	From Dudley st.....	"	"	280
Cottage st.....	At Bunker Hill st.....	Chs'n.	"	54
Mead st.....	" " " "	"	"	27
Haynes st.....	Orleans and Marginal sts.....	E. B.	"	653
	Total 4-inch.....			6,630
Sterling st. (J. P. A.)	Cabot and Tremont sts.....	Rox.	3-in.	230
Moon Island.....	On beach opp. Long Island.. ..		2-in.	250

**Gates Established and Abandoned during the Year and Number in use January 31, 1899, Exclusive
of Blow-off and Private Gates.**

	DIAMETER IN INCHES.													TOTALS.
	48	40	36	30	24	20	16	12	10	8	6	4	3	
Total number in use Jan. 31, 1898.	1	7	26	41	62	61	206	1,586	134	994	4,079	713	11	7,931
Established during the year. ....	.....	.....	.....	3	4	5	24	157	17	69	296	2	.....	577
Abandoned during the year. ....	.....	.....	.....	.....	.....	4	1	35	.....	15	87	26	1	169
Total number in use Jan. 31, 1899. ...	1	7	26	44	66	62	229	1,718	151	1,048	4,288	689	10	8,339

Blow-off Gates Established and Abandoned during the Year.

	DIAMETER IN INCHES.			TOTALS.
	4-in.	6-in.	12-in.	
Number established.....	9	6	1	16
Number abandoned.....	2	2	.....	4
Increase.....	7	4	1	12

Private Gates Established and Abandoned during the Year.

	DIAMETER IN INCHES.					TOTALS.
	3-in.	4-in.	6-in.	8-in.	12-in.	
Number established	1	2	*16	2	2	23
Number abandoned.....	.....	.....	.....	.....	.....	.....
Increase	1	2	16	2	2	23

*Twelve of these gates were established in connection with the salt-water hydrants, and have nothing to do with our system.

**Total Number of Hydrants Connected With Distribution
System, January 31, 1899.**

	Lowry.	Post.	B. Lowry	Boston.	Totals.	NOTES.
City Proper (Public).....	775	329	53	294	1,451	
“ “ (Private).....	10	.....	.....	45*	55	*27 not for fire.
South Boston (Public).....	229	146	28	165	568	
“ “ (Private).....	2	13*	.....	33*	48	*2 Bostons } *4 Posts } not for fire.
East Boston (Public).....	151	166	27	40	384	
“ “ (Private).....	8	7	.....	25*	40	*7 not for fire.
Roxbury (Public).....	627	416	84	55	1,182	
“ (Private).....	1*	.....	.....	10*	11	*1 Lowry } *1 Boston } not for fire.
Dorchester (Public).....	537	863	243	44	1,687	
“ (Private).....	.....	1*	1	5*	7	*2 Bostons } *1 Post } not for fire.
West Roxbury (Public).....	128	600	226	35	989	
“ “ (Private).....	.....	14	.....	1	15	
Brighton (Public).....	74	350	70	27	521	
“ (Private).....	.....	6	.....	2*	8	*2 not for fire.
Charlestown (Public).....	200	45	37	4	286	
“ (Private).....	14	36	1	6*	57	*1 not for fire.
Deer Island (Private).....	.....	18	.....	.....	18	
Long Island (Private).....	.....	6	.....	.....	6	
Thompson's Island (Private).....	.....	2	.....	.....	2	
Rainsford Island (Private).....	.....	1	3	1*	5	*1 not for fire.
Gallop's Island (Private).....	.....	1	.....	1*	2	*1 not for fire.
Brookline.....	5	.....	.....	3	8	
Chelsea.....	.....	.....	.....	7	7	
Quincy.....	.....	11	.....	.....	11	
Total Number, Public Hydrants.....	2,721	2,915	768	664	7,068	
Total Number, Private and Suburban Hydrants.....	30	126	5	139	300	

NOTE.—The salt water hydrants are not included in above as they are not connected with our system.

Water Posts.

DISTRICT.	Number in use Jan. 31, 1898.	Established during the Year.	Abandoned during the Year.	Number in use Jan. 31, 1899.
City Proper	55	16	1	70
South Boston.....	28	7	.....	35
East Boston.....	32	8	.....	40
Roxbury	69	6	1	74
Dorchester.....	83	14	8	89
West Roxbury.....	76	4	3	77
Brighton	45	5	.....	50
Charlestown.....	20	.....	.....	20
Totals	408	60	13	455

Causes of Repairs on Pipes of all Sizes.

Abolishment of grade crossings	12
Blasting	43
Broken by pile-driver	1
Broken by steam-roller	10
Broken in foundation wall	34
Defective couplings	29
Defective joints	159
Defective pipes	71
Defective packing	144
Defective stop-cocks	196
Eaten by soil	16
Frozen	57
Gnawed by rats	9
In way of various corporations	129
Main cocks renewed	167
New sidewalk cocks put in	6
New main uprights put on	70
On account of Sewer Department	89
Pipe stolen	1
Settling of earth	415
Sidewalk cocks renewed	311
Sidewalk uprights raised or lowered	381
Sidewalk uprights moved on account of edgestone	51
Stopped by dirt	101
Stopped by fish	176
Stopped by gasket	11
Stopped by rust	566
Struck by pick	129
Widening of streets	37
Worn out	11

3,432

**Statement of Miscellaneous Work Performed during the
Year 1898.**

Boxes over bridges repaired	40
Dead ends blown off	1,247
Examinations caused by false reports	894
Fountains repaired	252
Gates salted on account of cold weather	7,220
Gates inspected	16,250
Gates oiled and cleaned in service	219
Hydrant barrels changed for repairs	235
Hydrant boxes repaired in service	515
Hydrant boxes renewed	110
Hydrant boxes cleaned out	2,269
Hydrant inspections made on account of cold weather	150,181
Hydrants oiled in service	952
Hydrants painted	2,610
Hydrants repaired in service	323
Leaks found inside building line for owner to repair	356
Locations of gates marked and remarked	8,791
Meter boxes repaired in service	12
Putting hay in hydrant boxes	537
Stop-cock or gate boxes repaired in service	824
Stop-cock or gate boxes renewed in service	291
Streets repaired	1,463
Taking hay out of hydrant boxes	594
Taking hay out of meter boxes	893
Water posts repaired	979
Water turned on and off for repairs	244

Number of Repairs Made on Pipes of all Sizes from 1850 to 1898.

Year.	Number.	Year.	Number.
1850	104	1875.....	928
1851	237	1876.....	948
1852	323	1877.....	910
1853	345	1878.....	1,237
1854	354	1879.....	1,206
1855	294	1880.....	1,064
1856	307	1881.....	1,028
1857	363	1882.....	1,418
1858	311	1883.....	953
1859	531	1884.....	1,380
1860	592	1885.....	749
1861	508	1886.....	875
1862	490	1887.....	1,041
1863	494	1888.....	1,356
1864	489	1889.....	1,032
1865	607	1890.....	898
1866	675	1891.....	952
1867	609	1892.....	1,444
1868	531	1893.....	1,882
1869	489	1894.....	1,703
1870	864	1895.....	1,535
1871	1,565	1896.....	2,796
1872	1,647	1897.....	2,781
1873	1,229	1898.....	3,432
1874	2,594		

DRINKING FOUNTAINS.

Number, Style, Location.

(a) Indicates automatic fixtures for man and beast in warm weather, and a continuous flow of water for beasts in cold weather.

(b) Indicates automatic fixtures for beasts only. Continuous flow of water all the year.

(c) Indicates automatic fixtures for man in warm weather only.

(d) Indicates automatic fixtures for man and beast in warm weather only.

(e) Indicates cold water fountains with automatic fixtures for man in warm weather only.

City Proper.

- 43 a — Albany street, at Union Park street.
- 42 a — Albany street, at Lehigh street.
- 47 a — Albany street, opposite Concord street.
- 27 a — Atlantic avenue, at Rowe's wharf.
- 25 a — Atlantic avenue, junction Commercial street.
- 40 a — Beacon street, corner Charles street.
- 51 b — Beacon street, junction Commonwealth avenue.

- 36 c — Boston Common, corner Beacon and Charles streets.
- 35 c — Boston Common (Park square).
- 33 c — Boston Common (near old elm).
- 32 c — Boston Common (West street).
- 34 c — Boston Common (near band stand).
- 31 e — Boston Common (corner Park and Tremont streets).
- 38 e — Bowdoin square.
- 21 c — Causeway street, at Union Station.
- 22 a — Causeway street, junction Merrimac street.
- 39 a — Charles street, between Beacon and Boylston streets.
- 41 a — Columbus avenue, opposite Church street.
- 96 c — Copp's Hill terrace, opposite Charter street, North End park.
- 26 b — Custom House square.
- 29 a — Fort Hill square.
- 24 a — Haymarket square.
- 37 e — Hanover street, opposite Police Station No. 1.
- 23 a — Leverett street, at Craigie's bridge.
- 44 a — Malden Street, junction Wareham street.
- 50 a — Massachusetts avenue, near Westland avenue.
- 20 c — North End park, at men's bath-house.
- 18 e — North End park, at women's bath-house.
- 19 e — North End park, rear band-stand.
- 28 b — Post Office square.
- 45 a — Tremont street, at Clarendon street.
- 46 a — Washington street, at Blackstone square.
- 95 e — Washington street, at State street.
- 30 a — Winthrop square.

East Boston.

- 12 b — Bennington street, junction Chelsea street.
- 14 b — Central square.
- 16 c — Lewis street, at Webster street.
- 94 e — 120 Marginal street.
- 15 b — Maverick square.
- 17 c — Maverick street, corner Cottage street.
- 11 c — Neptune road, at Wood Island Park.
- 13 c — Prescott street, at Bennington street.
- 10 c — Saratoga street, junction Pope street.
- 9 b — Square at Winthrop junction.

South Boston.

- 74 a — A street, near First street.
- 81 b — Andrews square.
- 82 c — Andrews square.
- 73 d — Foundry street, opposite First street.
- 75 c — Fourth street, corner Dorchester street.
- 77 a — Fourth street, junction Emerson street.

- 78 a — Independence square.
- 80 c — Q street, at Fifth street.
- 79 c — Sixth street, near P street.
- 76 c — Thomas park.

Roxbury.

- 48 a — Albany street, junction Dearborn street.
- 55 a — Columbus avenue, near Whittier street.
- 59 c — Dale street, near Bainbridge street.
- 53 c — Eliot square.
- 52 b — Eliot square.
- 49 a — Eustis street, junction Washington street.
- 60 a — Heath street, at Huntington avenue.
- 57 a — Junction Columbus avenue and Centre street.
- 56 a — Hanley square (Columbus avenue, opposite Roxbury street).
- 54 a — Tremont street, junction Cabot street.
- 58 a — Walnut avenue, opposite Circuit street.

West Roxbury.

- 61 a — Centre street, junction Day and Perkins streets.
- 62 a — Centre street, junction South street.
- 66 a — Centre street, opposite Spring street.
- 63 d — South street, junction Morton street.
- 65 a — Washington street, junction South st.
- 64 b — Washington street, opposite Forest Hills Station.

Brighton.

- 68 a — Barry's corner.
- 72 c — Beacon street, opposite Chestnut Hill Reservoir.
- 71 a — Market street, Cattle Fair Hotel.
- 67 a — Union square.
- 69 a — Western avenue, Charles River Hotel.
- 70 a — Washington street, at Oak square.

Dorchester.

- 88 a — Adams street, opposite Minot street.
- 93 a — Blue Hill avenue, junction Washington street.
- 92 d — Blue Hill avenue, opposite Franklin park.
- 84 b — Eaton square (granite bowl).
- 86 a — Freeport street, opposite Beach street.
- 85 a — Glover's corner.
- 91 a — Junction Washington, Centre, Norfolk streets and Talbot avenue.
- 87 a — Neponset avenue, opposite Walnut street.
- 89 a — Pierce square (Milton Lower Mills).
- 90 b — River street, junction Blue Hill avenue.
- 83 a — Upham's corner.

Charlestown.

- 5 d— Austin street, near Main street.
- 7 d— Chelsea street, opposite Mystic playgrounds.
- 8 e— City square.
- 6 e— Junction Vine and Bunker Hill streets.
- 4 a— Rutherford avenue, at Dunstable street.
- 1 b— Sullivan square.
- 3 c— Sullivan square.
- 2 e— Sullivan square.

APPENDIX D.

REPORT OF THE ENGINEER.

ENGINEERING DEPARTMENT,

50 CITY HALL, February 1, 1899.

HON. JOHN R. MURPHY,

Water Commissioner :

SIR,—I hereby submit the following report of the work done and records kept during the past year :

On January 1, 1898, the Metropolitan Water Board, under the provisions of chapter 488 of the Acts of 1895, made takings of the entire Boston Water Works system westward of Chestnut Hill Reservoir; of Chestnut Hill Reservoir and that part of the adjoining lands included within the road encircling the reservoir; of Chestnut Hill Pumping Station and a portion of the land easterly of the Pumping Station; of the Mystic system west of and including Mystic Reservoir on College Hill, Medford, and a portion of the mains of the Mystic System. On the same date water from the Metropolitan System was supplied to the City of Boston, and Mystic Lake as a source of water supply was abandoned. On April 21, 1898, the Metropolitan High Service was supplied to East Boston, and the local pumping station was abandoned. On February 1, 1899, the Metropolitan Water Board began the operation of the pumping station, supplying the double high service in West Roxbury.

DISTRIBUTION.

During the past year 33.6 miles of water pipes were laid and 9.1 miles were abandoned, making a total of 689.2 miles; this total length includes mains belonging to the city of Boston only, and does not include the systems of Chelsea, Somerville and Everett, and that portion of the Boston system acquired by the Metropolitan Water Board, all of which were formerly included in the reports of the City Engineer under the heads of Cochituate and Mystic Divisions.

The changed conditions occasioned by the Metropolitan supply caused some anxiety in regard to the safety during the winter season of the large mains supplying Charlestown and of those over Warren bridge; where formerly a well defined current had existed it was thought that the present slow movement of water in the pipes might be insufficient to prevent freezing, and some of the lines were shut off and emptied during the cold weather. Daily determinations were made of the temperature of the water in all mains where danger was supposed to exist and thermophone readings were taken in the bottoms of siphons on lines that had been emptied. These readings were plotted daily and afforded opportunity for careful study of the existing conditions. When the readings became dangerously low, means were taken to increase the circulation in the pipe in danger.

The year has been an active one, as the record of pipe laid shows; for all work done plans have been made and lines and grades have been furnished where necessary.

The Dorchester high service line was completed to Washington street, via Geneva avenue and Bowdoin street, at Columbia road, the size being reduced to 30 inches; connections were made with 24-inch and 16-inch lines in Columbia road, with a 12-inch line in Bowdoin street and with a 12-inch line in Washington street. The 36-inch pipe in Geneva avenue from Grove Hall to Columbia road was laid under contract by H. P. Nawn.

The 24-inch high service in West Roxbury was extended from Forest Hills through South street to the Arnold Arboretum, and thence through Weld street to South street, connecting with the 8-inch line in Weld street and the 16-inch in Roberts street; sufficient increase of pressure resulted from this extension to allow the Skinner Hill district to be taken off the supplementary high service.

A large amount of work was done in Columbia road; new service mains were laid on each side of the road for practically the entire distance from Blue Hill avenue to Edward Everett square; a 24-inch high service main was laid (with the exception of a gap at the New York, New Haven & Hartford Railroad) from Geneva avenue easterly; at Quincy street it reduces to 20-inch and so continues to Upham's Corner. A large portion of the 20-inch and 16-inch mains were relaid from Upham's Corner to Edward Everett square.

In Roberts street a 16-inch main was laid, designed for future extension easterly to Dorchester.

In South Boston the 20-inch low service main was carried to City Point by way of Dorchester and Third streets, giving

an abundant supply of water for fire purposes in a district where the protection had been inadequate. Connections were made with the pipes in Dorchester, L., P. and Q. streets.

The water supply at Thompson's, Long, Rainsford's and Galloup's Islands and at Fort Warren has been unsatisfactory for several years; this fact, added to the possibility of the batteries on Long Island and Fort Warren being called upon for service against a Spanish fleet, called for prompt action, and a 16-inch pipe was laid in Ashmont street and Neponset avenue to the Neponset River, replacing a 12-inch pipe, and a 12-inch was laid from the river to Moon Island in addition to the 6-inch in service. A connection was also made with the Quincy system on Hancock street for use in an emergency.

The most important piece of relaying was on Harrison avenue, where the old 6-inch pipe was replaced with a 12-inch from West Newton street to Massachusetts avenue and with a 16-inch from Massachusetts avenue to Vernon street.

In all 8.0 miles of old and small pipe have been relaid.

It is the practice of the Street Department to notify the different departments of the city of its intention to build or rebuild streets; in all cases the pipes, hydrants, etc., upon such streets were adjusted. This practice caused a large amount of work, particularly in the city proper.

During the year an effort has been made to abolish "dead ends" with a resulting improvement both in the domestic and fire service. One hundred and fifty Boston hydrants have been taken out. In this connection I would urgently recommend the adoption of an independent valve post hydrant with two large steamer outlets running parallel with the line of the street. Such a hydrant would prove much better adapted to the needs of the Fire Department than the type of post hydrant in service.

THE CORROSION OF PIPES BY ELECTROLYSIS.

There has been no marked change in electrical conditions in the water pipes during the past year. Serious damage from electrolysis is undoubtedly a possibility and safety can be hoped for only through systematic and continued investigation. The protective measures employed in the past have in a measure proved effectual; yet it is very possible that more radical steps must be taken in the near future to guard against disaster. The subject has been carefully studied during the year by Messrs. Stone & Webster, by whom many observations were made throughout the city. The following is their report:

STONE & WEBSTER, ELECTRICAL EXPERTS AND ENGINEERS,
4 POST OFFICE SQUARE, BOSTON, February 1, 1899.

WILLIAM JACKSON ESQ.,

City Engineer, Boston, Mass. :

DEAR SIR, — At your request we have made during 1898, as in previous years, electrical surveys in all parts of the city of Boston covered by the electric car tracks, in order to determine the progress of electrolytic corrosion of water pipes.

Heretofore we have relied upon readings taken between the water pipes (at fire hydrants) and the ground as the most accurate index to the locality of trouble. In 1897 we also took readings between hydrants and rails, but used only the hydrant-to-ground readings in comparing the conditions of 1897 with those of 1896. In 1898, however, we confined ourselves almost entirely to readings between hydrants and rails, as we believe them more reliable for studying the situation as a whole. For particular localities, as in the neighborhood of Freeport street power station, we took ground readings also.

In other cities we have obtained hydrant-to-rail measurements in investigations made during the year, and find the only objection to the method is that the size of the single reading is not always a criterion of the amount flowing between the points at which the measurement is made. Very reliable data can, however, be obtained if hydrant-to-rail measurements are made in connection with other readings in the same locality, taken under various conditions. The objection to the hydrant-to-ground system, formerly used, is that the readings vary with the condition of the soil and are therefore not as trustworthy for general comparison, as hydrant-to-rail readings.

In diagram I. we give the maximum value of readings taken between hydrants and rails. On this diagram we have divided the city into convenient sections, shown by the red lines. The figures in red give the average voltage throughout the various sections for 1897 and 1898. The plus readings (indicated by + sign) show that the current flows from pipes to rails, the minus readings (indicated by O) show the reverse. As might be expected, many of the readings are fluctuating, and are so indicated on the diagram by a cross within a circle. Where no number accompanies a cross or a circle the reading was less than one quarter ($\frac{1}{4}$) of a volt. We have recorded on the diagram readings of one quarter ($\frac{1}{4}$) of a volt and up to three quarters ($\frac{3}{4}$) as if they were one half ($\frac{1}{2}$) volt, and readings of three quarters ($\frac{3}{4}$) up to one and one quarter ($1\frac{1}{4}$) as if they were one (1) volt; and so

with still higher readings; that is, we have recorded the nearest even half ($\frac{1}{2}$) volt, our purpose being to simplify the figures and make it easy to compare them, extreme accuracy being neither essential nor possible in an investigation of this kind. We have not given the readings where they were sometimes positive and sometimes negative. Readings were taken between pipes and ground in the neighborhood of the Dorchester power station (*i.e.*, on Freeport and Park streets). These are not given on the diagram, but only the signs indicating the direction of the flow of the current.

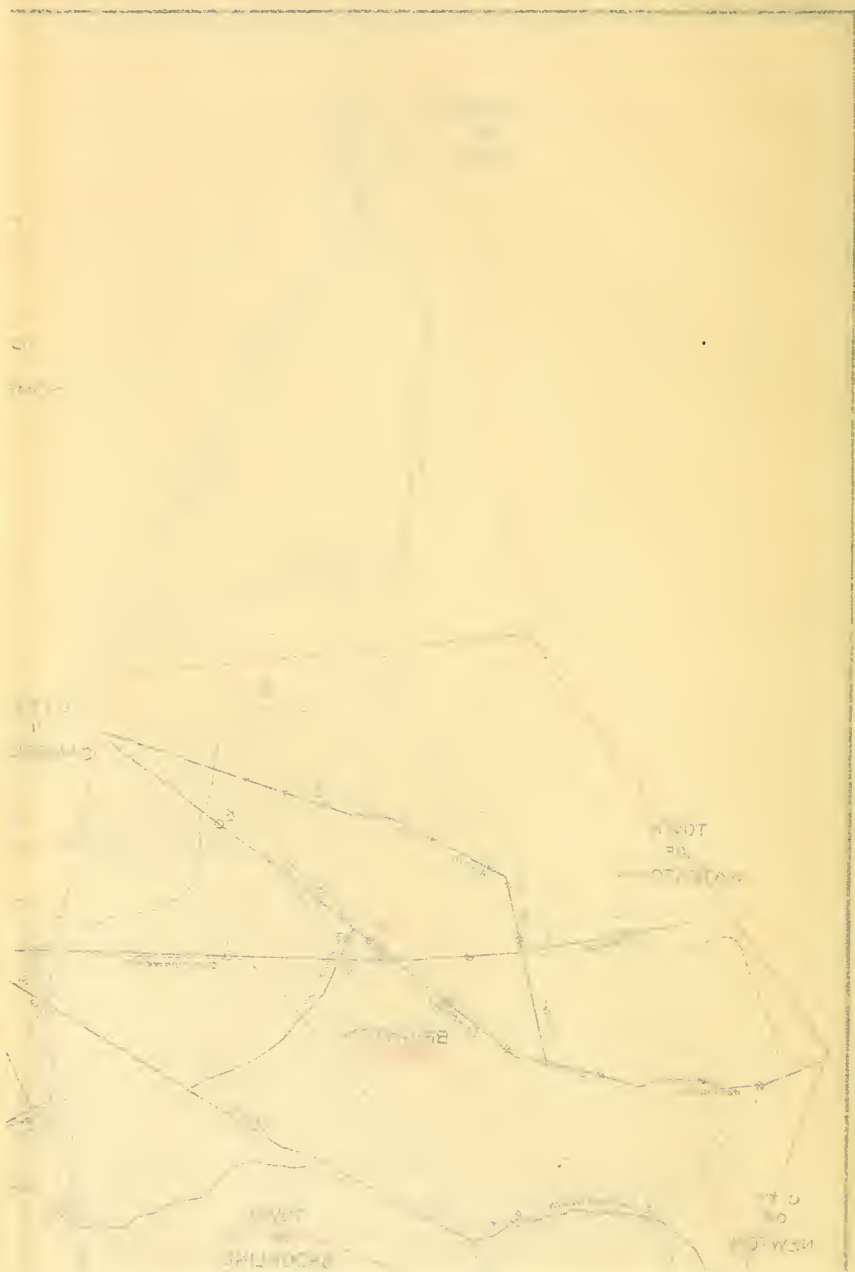
It will be seen that on the average the conditions for the past two years have been about the same, the difference being slightly in favor of 1897. The general averages are as follows:

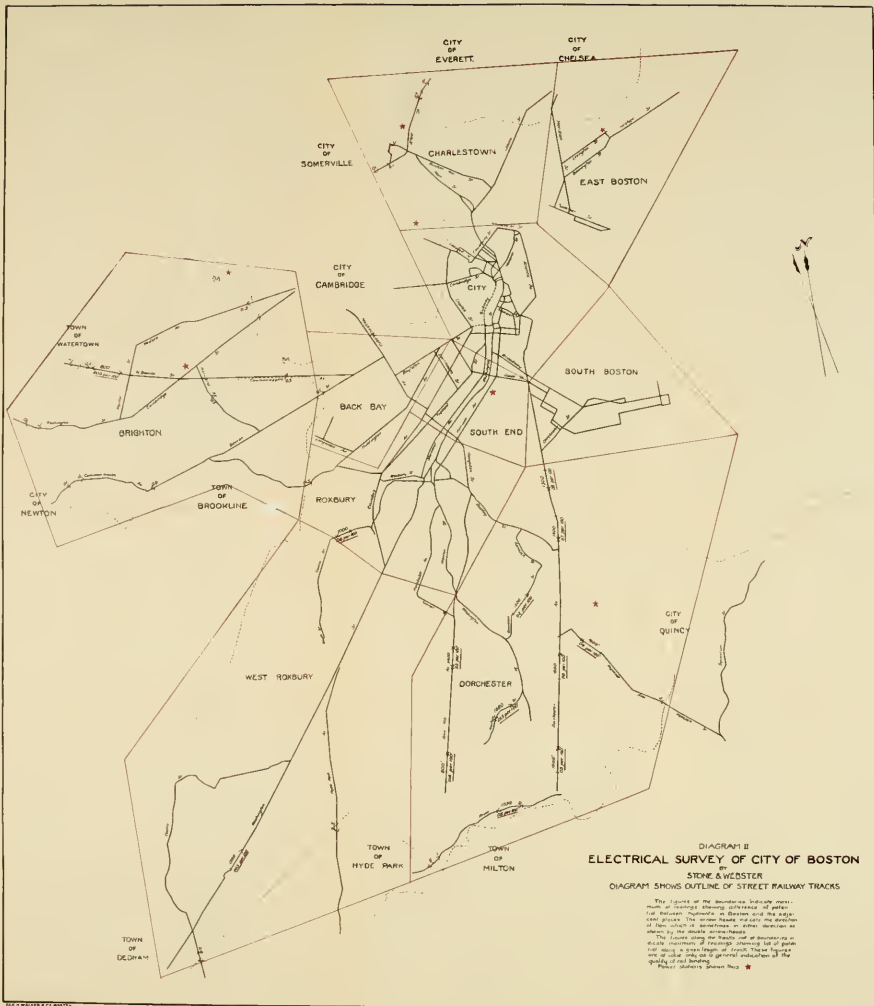
Av. positive readings, 1898	+1.4	Av. negative readings, 1898	-1.4
“ “ “ 1897	+1.3	“ “ “ 1897	-1.2

We wish to call attention to the positive readings along Dorchester and Neponset avenues and also along Harrison avenue, and to the negative readings along Centre street, near the Roxbury boundary, as well as along Centre street in the West Roxbury and Roslindale loop, and also on Bunker Hill street in Charlestown.

Large positive readings as shown at the former places indicate that much current is flowing off the pipes to the rails. This flow will be only increased by improving the rail-return system in a district where the readings are positive. The source of trouble will be found at some point more or less distant, where the track-return system is insufficient, so that the current leaves the tracks, seeking a path of less resistance by the pipes. Therefore, in a “positive” district the only direct remedy that can be applied is to make the piping system itself a better conductor so as to keep the current from leaving it and flowing through the earth to the rails. This remedy, however, should be considered as only a temporary expedient since it causes a large flow of current through the pipes, thus exposing them to an added danger of corrosion at the joints wherever the electrical connection is imperfect. It may, however, be resorted to in cases where the real source of trouble cannot be immediately located and where the continual passage of current from pipes to ground is causing deterioration.

With this in mind we advised bonding the water main to the return feeder in the power station on Freeport street, and also to the underground return feeder near by on Park





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street. These connections were made November last. Before we can be certain that similar connections should be made on Harrison avenue or the Central Power Station district, the results of the bonding in the Dorchester district will have to be carefully studied.

Large negative readings, as observed in some of the sections above mentioned, indicate that considerable current is flowing on to the water pipes. In these sections better bonding, or a more effective return conductor of some sort, should be provided.

On diagram II. are shown the readings taken in the outskirts of the city between hydrants of the Boston system and those of adjacent places. We spoke in our last report of the advisability of making a special study of this current flowing across the border of the city. We have found a greater tendency to flow off the Boston pipes in 1898 than in 1897. The detail results of the 1898 test are shown on Diagram II. We expect to give this matter more particular attention and hope to be in a position to submit a more definite report with regard to it during the coming year.

For the purpose of investigating the general efficiency of the rail-bonding we took several readings along sections of track from 1000 to 1800 feet in length, and the figures given on the diagram show the fall of potential per 100 feet as computed from the data obtained. There was no indication of very defective rail-bonding thus revealed, but the readings will be of use in giving a standard for comparison on other occasions. The variations in the figures are largely due to varying numbers of cars in the different sections of the street railway system.

We reported last year that the underground return-feeder system of the Dorchester District threatened to cause trouble in the service pipes before long, and our investigations since then tend to confirm this opinion. Our attention was called on March 21 of this year to a broken service on Park street, and examination shows that electrolysis is undoubtedly the cause of the break. A section of the pipe has been returned and is kept for exhibit. The readings between this pipe and the ground were as high as $\frac{4}{10}$ of a volt, which is unusual for a ground reading.

In general we think there is much likelihood that electrolytic corrosion is going on in the two danger districts above mentioned and to a smaller degree in one or two other places where positive readings are shown. Another place in particular to which we would call attention is on Hyde Park avenue between Walk Hill street and Forest Hills station.

Careful watch should be kept of all localities where trouble is indicated lest the conditions change for the worse. Occasional bursting of pipes from single leaks is not to be feared so much as the continual wasting that may go on from current escaping over large sections.

Yours very truly,

(Signed) STONE & WEBSTER.

SALT-WATER FIRE SYSTEM.

A salt-water system for fire protection was established under a special appropriation granted to the Fire Department. It consists of a 12-inch pipe, extending from Central Wharf through Central and Exchange streets, Post-office square and Congress street to Congress street bridge, a total distance of about one mile. At Central Wharf the line divides into two 10-inch pipes, to each of which is attached a special casting, fitted with six 3½-inch outlets, with check valves on each outlet. This design enables one or both fireboats to connect with the pipe through lines of 3½-inch hose, varying in length from fifteen to thirty feet. A similar boat connection will be established at Congress-street bridge.

With the exception of a short exposed piece of pipe at each end of the line the system is maintained full of water from a check-valve to Central Wharf to a similar valve at Congress-street bridge, pressure being maintained up to check-valves and to foot-valves of hydrants by means of a 1-inch pipe connecting with a tank in the Post-office building, which is fed directly from the city mains. Check-valves in this connecting pipe close when fire pressure exceeds the ordinary domestic pressure.

Six-inch relief valves are set on the main pipe to prevent the maximum pressure exceeding 200 pounds per square inch. In service, when the first hose connection has been made between the fireboat and the end of the pipe, the former can begin to pump slowly, expelling the air from the empty end near the boat through an air-cock provided for the purpose. When the requisite number of connections have been made, the air has been driven out and the boat is ready to respond to a signal from a hydrant to "go ahead." Hydrants are established about 300 feet apart, each gated off from the main line. The hydrant used was the Bachelder (so called from the name of the inventor and patentee, E. J. Bachelder, master mechanic of the Boston Water Department). It is a post hydrant of unusually heavy design, with three 3-inch outlets,

each controlled by an independent valve. The waste is positive and is operated by a wrench from the street surface. A hole is cored out in the side of the hydrant for an electric cable, terminating in a recess at the top, forming a signal-box, thus affording means of electrical connection in the hydrant itself and avoiding the necessity of an independent post for that purpose.

The pipe used was cast-iron, of the general Boston Water Works pattern, with the innovation of two lead scores in the bell. It was unusually heavy, being one inch thick, and weighing 1,704 pounds per length laying twelve feet.

Owing to the fact that the system was to be kept full of salt water it was decided that the ordinary type of valves built of iron and composition were not suitable, as a destructive galvanic action would result. The valves adopted were of composition throughout, with flanged ends, and were separated from the adjoining cast-iron pipes by heavy rings of pure rubber. The precautions taken in the case of the hydrants, which are empty when not in use, were to separate the composition valve-seat from the iron hydrant-pot by a lead joint, also to protect the end of the iron valve stem by a composition cap, making a tight joint with the rubber-foot valve.

An electrical duct, laid in the main pipe trench, carries a five conductor cable with connections to each hydrant; two of these conductors are utilized, forming part of the regular electrical system of the Fire Department. Each hydrant is equipped with a break key, whereby the code signals can be transmitted to the fireboat; portable instruments, consisting of Morse key and sounder, can also be connected into circuit at all hydrants and boat stations; thus, communication is possible at will between the hydrants, boat stations and central office. Two of these portable instruments are carried on each fireboat, for use at the boat and at the hydrant in service.

A trial made at a distance of one-half mile from the water front, with one boat in service, conclusively proved that the system is a valuable addition to the equipment of the Fire Department; with an unlimited water supply and with a nominal pumping capacity of 6,000 gallons per minute when one fireboat is in service, or double that amount when both boats are used, the system can be depended upon to furnish a number of streams equal in power to those from the largest "Steamers," and, when necessary, streams of unusual power are available, *e.g.*, at the trial mentioned two streams each of 1,500 gallons per minute were played simultaneously through

2½-inch nozzles with a nozzle pressure of fifty pounds ; three lines of 3-inch hose, each 300 feet long, were siamezed in this test.

All the work of establishing the salt-water system was done by the Water Department, with the exception of the electrical service, which was installed by the Fire Department.

Yours respectfully,

WILLIAM JACKSON,

City Engineer.

SALT WATER FIRE-PIPE TEST, NOVEMBER 13, 1898.

[illegible]

Lines 1, 2 and 3, from hydrami at Post Office square

Lines 4, 5 and 6, from hydrant on Congress street, near Mill street

In the last three sets of experiments, two Eastman Sets were used with three lines from each hydrant. Each Eastman Set includes 15 feet of 3/4 inch hose.

In the set of experiments with six 1/2 inch nozzles, the discharge from Lines Nos. 5 and 6 is approximate, as no pressures were taken at the nozzles. Therefore the total discharge for this set of experiments is approximate.

GENERAL STATISTICS.

BOSTON WATER DEPARTMENT.

Daily average amount used through meters, gallons	15,717,100
Number of services	84,114
Number of meters and motors	4,865
Length of supply and distributing mains, in miles	689.2
Number of public fire-hydrants in use	7,068
Yearly revenue from water-rates	\$2,318,296 74
Yearly revenue from metered water	\$909,196 35
Percentage of total revenue from metered water,	39.2
Yearly expense of maintenance	\$543,390 77

Average Maximum and Minimum Monthly and Yearly Heights, in Feet, Above City Base, to which Water would Rise at Different Stations on the Boston Water Works.

1898.	Boston Common.		Engine-house No. 8, Salem Street.		Engine-house No. 7, East Street.		Engine-house No. 38, Congress Street, Boston.		Engine-house No. 2, Fourth Street, South Boston.		Engine-house No. 9, Paris Street, East Boston.		Engine-house No. 16, River Street, Dorchester.		Engine-house No. 32, Bunker Hill Street, Charlestown.		710 Albany Street.		Engine-house No. 18, Harvard Street, Dorchester.		High Service, City Hall.		High Service, Engine-house No. 24, Quincy Street.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
January ..	121.0	103.9	123.1	103.7	121.4	103.6	119.9	102.4	119.9	99.9	115.7	89.4	121.4	102.7	115.4	81	123.0	106.4	236.5	204.7	249.2	241.3	239.8	217.7
February..	120.9	102.5	124.0	103.5	120.5	103.1	119.7	102.1	119.0	99.0	115.9	90.1	120.5	101.6	153.9	149.0	121.1	105.6	234.8	210.5	248.2	241.2	239.2	221.2
March.....	125.8	105.8	127.7	106.6	125.2	106.1	124.6	104.8	125.2	103.2	121.6	98.8	126.0	105.2	154.9	150.4	125.9	108.6	239.8	213.5	251.2	244.7	242.3	222.7
April	127.8	110.0	127.0	109.7	126.3	109.6	125.8	109.3	126.8	106.1	125.0	100.0	126.7	108.5	153.6	148.6	127.6	112.4	240.2	211.7	251.6	244.4	242.6	222.1
May	128.7	111.3	127.9	109.1	126.9	109.8	126.6	108.4	127.7	106.0	155.2	147.0	127.9	108.8	154.5	151.3	128.2	112.0	246.7	232.4	251.3	245.1	248.5	240.9
June	128.9	110.9	127.9	108.2	127.3	109.4	125.9	107.6	127.8	105.4	155.0	146.4	127.8	107.7	154.9	151.9	128.0	111.6	247.0	229.5	251.9	245.4	248.3	240.6
July	128.8	110.6	127.6	108.0	.....	.....	126.0	108.0	127.0	104.1	155.1	145.3	127.5	107.7	156.1	152.1	127.8	111.9	245.8	229.8	251.4	247.0	248.1	240.8
August....	128.4	110.1	128.6	107.6	.....	.....	125.7	107.1	126.3	102.7	154.0	143.6	127.0	106.6	155.6	151.7	127.4	110.3	245.5	230.3	250.6	246.2	247.6	241.4
September.	128.7	109.7	128.9	109.3	.....	.....	126.0	106.9	127.2	104.3	154.6	144.6	127.5	106.4	155.7	151.6	127.4	110.9	245.2	227.1	250.1	246.0	246.5	238.7
October....	129.2	113.0	129.6	111.7	128.3	111.4	126.5	110.0	127.7	107.5	155.1	145.5	128.1	109.8	155.2	151.9	127.7	113.1	246.6	233.2	250.8	246.0	247.1	239.9
November..	129.3	113.5	129.6	112.3	128.7	113.3	127.0	111.5	128.1	109.0	154.4	146.2	129.4	111.5	154.4	152.0	127.8	114.1	.....	.....	250.6	246.3	248.4	242.0
December..	126.0	110.3	126.1	112.3	126.3	110.0	125.0	108.7	124.8	105.4	151.0	141.3	126.0	108.0	152.1	147.2	125.7	111.0	.....	.....	250.7	246.5	248.4	243.2
Averages.	127.0	109.3	127.3	108.5	125.7	108.5	124.9	107.2	125.6	104.4	154.4	145.2	126.3	107.0	154.6	150.4	126.5	110.7	.....	.....	250.7	245.0	247.9	240.9

¹ On April 21, East Boston supplied from Metropolitan L. S. ² On April 26, 36-inch high service line through Roxbury turned on.

³ On January 1, Charlestown supplied by Metropolitan L. S.

Statement of Operations at the East Boston Pumping Station for the Year 1898.

1898.	ENGINES NOS. 1 AND 2.				ENGINE NO. 3.				Total amount of coal consumed.	Per cent. of ashes and clinkers.
	Total pumping time.		Total amount pumped to Reservoir.	Daily average.	Total pumping time.		Total amount pumped to tank, Breed's Island.	Daily average.		
Month.	Hrs.	M.	Gallons.	Gallons.	Hrs.	M.	Gallons.	Gallons.	Lbs.	Per cent.
January.....	357	15	15,682,660	505,892	182	45	2,835,000	91,452	63,540	20.2
February....	345	45	15,103,200	539,400	172	45	2,815,680	100,560	61,670	20.3
March	303	15	12,375,300	399,203	175	00	2,873,040	92,678	54,870	19.5
April	189	45	7,609,980	380,499	170	15	2,639,280	87,976	38,600	19.5
May .....	.....	.....	.....	.....	172	00	2,392,200	77,168	20,520	19.9
June .....	.....	.....	.....	.....	183	45	2,564,400	85,480	17,110	19.6
July .....	.....	.....	.....	.....	214	30	3,169,080	102,228	19,270	19.9
August.....	.....	.....	.....	.....	185	00	2,640,840	85,189	15,970	19.2
September...	.....	.....	.....	.....	158	15	2,221,380	74,046	15,280	18.3
October.....	.....	.....	.....	.....	157	00	2,253,480	72,693	16,680	18.7
November. ....	.....	.....	.....	.....	153	15	2,183,100	72,770	18,300	18.5
December. ....	.....	.....	.....	.....	158	15	2,201,160	73,372	20,450	18.4
Totals and Averages..	1,196	....	50,771,140	457,398	2,082	45	30,788,640	84,817	362,260	19.6

On April 22 all of East Boston (except what tank supplies) supplied from Metropolitan.

*Statement of Operations at the West Roxbury Pumping Station for the
Year 1898.*

1898.	Total pumping time.		Total amount pumped.	Daily average amount pumped.	Quantity pumped per lb. of coal.	Total amount of coal consumed.	Per cent. of ashes and clinkers.	Average lift.
Month.	Hours.	Min.	Gallons.	Gallons.	Gallons.	Lbs.	Per cent.	Feet.
January...	671	00	9,517,620	307,020	181.6	52,385	17.7	154.1
February ..	595	00	8,263,928	295,140	167.2	49,400	17.9	151.3
March.....	659	00	8,598,938	277,385	171.0	50,275	16.7	148.2
April.....	631	00	8,253,563	275,118	179.5	45,975	16.5	148.3
May.....	658	00	9,367,988	302,193	188.5	49,700	16.5	143.7
June.....	697	30	9,627,901	320,930	187.3	51,400	16.7	146.1
July.....	753	00	10,455,638	337,279	175.3	59,625	16.9	147.0
August.....	694	00	10,019,738	323,217	173.4	57,800	16.4	144.1
September..	660	30	10,184,813	339,494	179.2	56,850	15.9	144.8
October	694	00	8,435,962	272,128	171.9	49,075	15.8	138.5
November..	638	00	7,322,363	244,079	180.2	40,625	15.9	131.9
December..	497	00	7,102,501	229,113	170.5	41,650	16.6	126.2
Totals and Averages,	7,848	00	107,150,953	293,564	177.2	604,760	16.6	143.7

Monthly Rainfall in Inches, during 1898, at Various Places in Eastern Massachusetts.

PLACE.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Framingham	6.54	4.27	2.40	4.73	3.05	2.24	3.98	7.42	2.09	7.01	7.24	3.30	54.27
Dam 4, Ashland	7.11	4.70	2.40	4.59	3.40	2.25	4.65	7.54	2.81	6.72	6.64	3.28	56.09
Cordaville	7.27	4.72	2.55	4.86	3.29	2.96	3.76	9.02	3.25	6.55	6.58	3.44	58.25
Lake Cochituate	6.83	4.29	2.54	5.07	3.07	2.08	3.55	7.08	3.03	6.82	6.91	3.44	54.71
Chestnut Hill Reservoir	5.60	5.58	2.20	6.17	4.45	2.36	5.57	6.06	1.77	7.38	7.42	2.93	57.49
Mystic Lake	5.62	5.00	2.11	6.21	3.97	2.06	5.57	7.50	2.61	7.37	6.81	3.00	57.86
Gibson street, Dorchester				6.91	4.03	1.80	6.07	5.68	1.93	7.85	4.97	2.53	.....
Cambridge Observatory	4.07	5.35	2.03	5.26	3.73	1.66	4.25	7.29	1.72	6.71	6.63	2.53	51.23
Waltham, Boston Manufacturing Company	6.19	3.42	2.18	6.54	3.39	1.92	5.74	6.37	1.62	6.93	6.50	3.30	54.10
Lowell, Locks and Canals Company	4.52	7.05	1.65	5.20	3.04	3.65	2.93	8.23	1.97	6.85	6.45	2.74	54.28
Average of above ten places	5.97	4.93	2.23	5.55	3.54	2.30	4.61	7.22	2.28	7.02	6.62	3.05	55.36

¹ BOSTON WATER BOARD.

ORGANIZED JULY 31, 1876.

TIMOTHY T. SAWYER, from July 31, 1876, to May 5, 1879; and from May 1, 1882, to May 4, 1883.

LEONARD R. CUTTER, from July 31, 1876, to May 4, 1883.²

ALBERT STANWOOD, from July 31, 1876, to May 7, 1883.²

FRANCIS THOMPSON, from May 5, 1879, to May 1, 1882.²

WILLIAM A. SIMMONS, from May 7, 1883, to August 18, 1885.

GEORGE M. HOBBS, from May 4, 1883, to May 4, 1885.

JOHN G. BLAKE, from May 4, 1883, to August 18, 1885.

WILLIAM B. SMART, from May 4, 1885, to March 18, 1889.

HORACE T. ROCKWELL, from August 25, 1885, to April 25, 1888.

THOMAS F. DOHERTY, from August 26, 1885, to May 5, 1890; and from May 4, 1891, to July 1, 1895.

ROBERT GRANT, from April 25, 1888, to July 18, 1893.

PHILIP J. DOHERTY, from March 18, 1889, to May 4, 1891.

JOHN W. LEIGHTON, from May 5, 1890, to July 1, 1895.²

WILLIAM S. McNARY, from August 15, 1893, to November 5, 1894.

CHARLES W. SMITH, from January 23, 1895, to July 1, 1895.

¹ *Water Commissioners.*

CHARLES W. SMITH, from July 1, 1895, to January 20, 1896.³

JEREMIAH J. MCCARTHY (Acting), from January 20 to February 1, 1896.

JOHN R. MURPHY, from February 1, 1896, to present time.

Assistant Water Commissioners.

JEREMIAH J. MCCARTHY, from July 1, 1895, to January 20, 1896.

EDWARD C. ELLIS, from February 17, 1896, to present time.

Chief Clerk and Secretary.

WALTER E. SWAN.

General Superintendent Income Division.

JOS. H. CALDWELL.

General Superintendent Distribution Division.

HUGH McNULTY.

City Engineer and Engineer of the Department.

WILLIAM JACKSON.

¹ Under Chap. 449 of the Acts of 1895, the Boston Water Board was abolished, and the Water-Supply and Water-Income Departments consolidated and placed under the charge of one Water Commissioner.

² Deceased.

³ Resigned.

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